



# INNOVATION

at its *Sweetest*

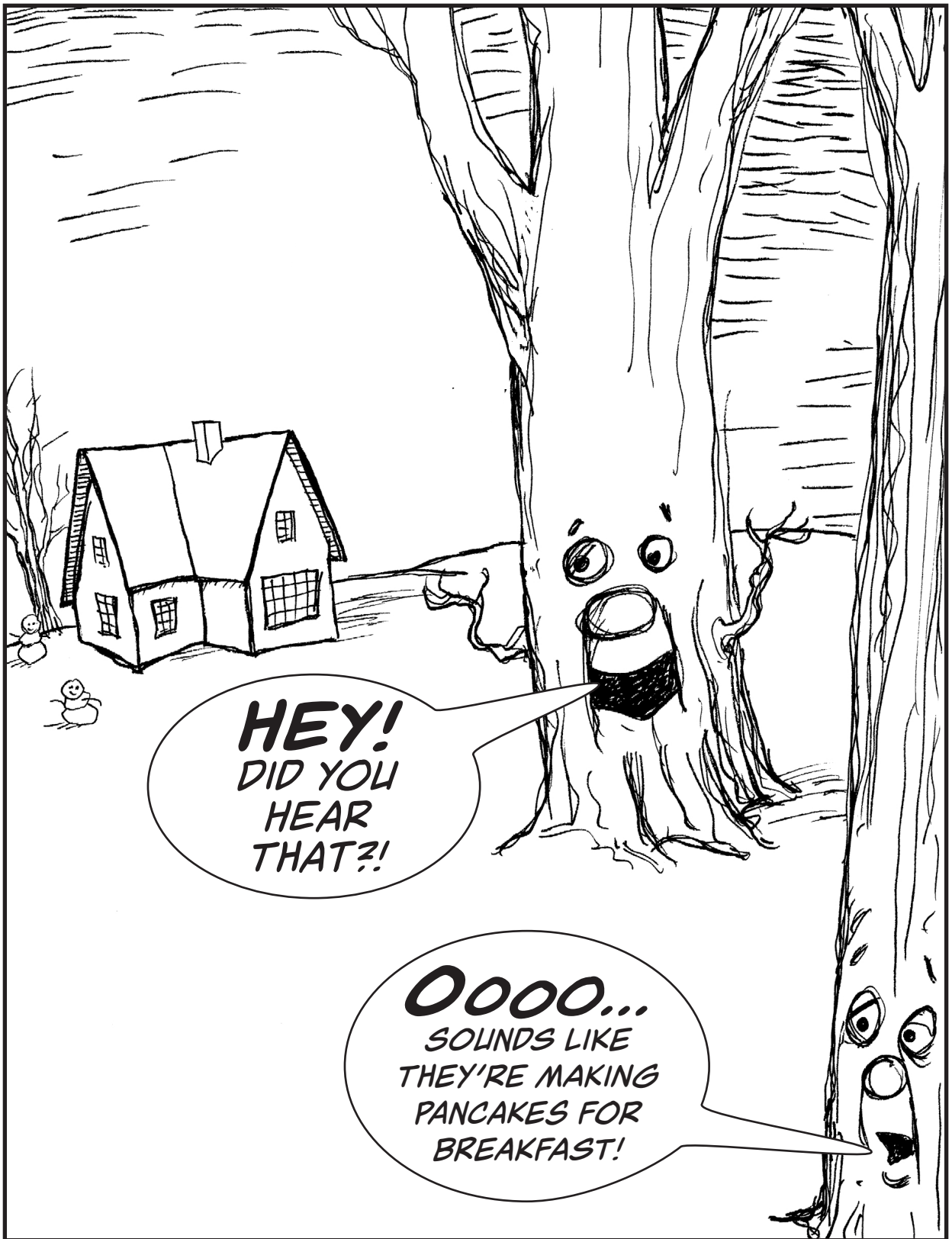
A Complete History *and*  
Scientific Explanation of

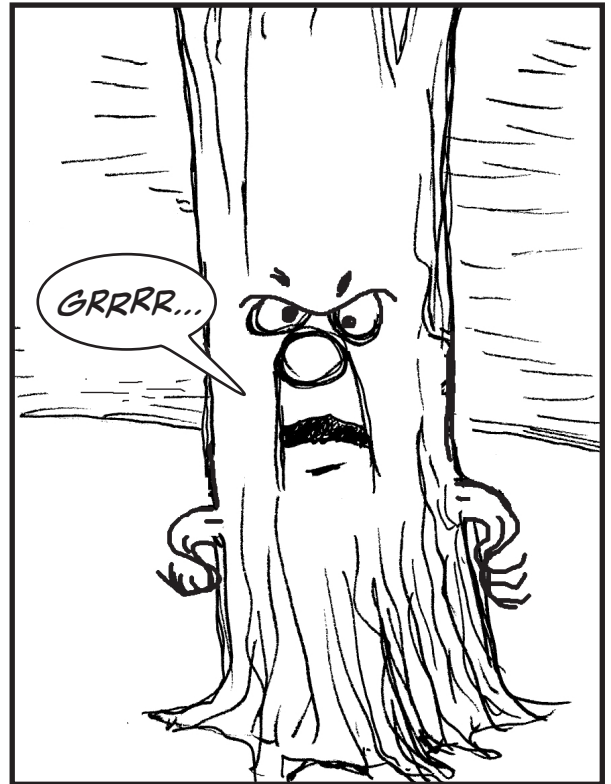
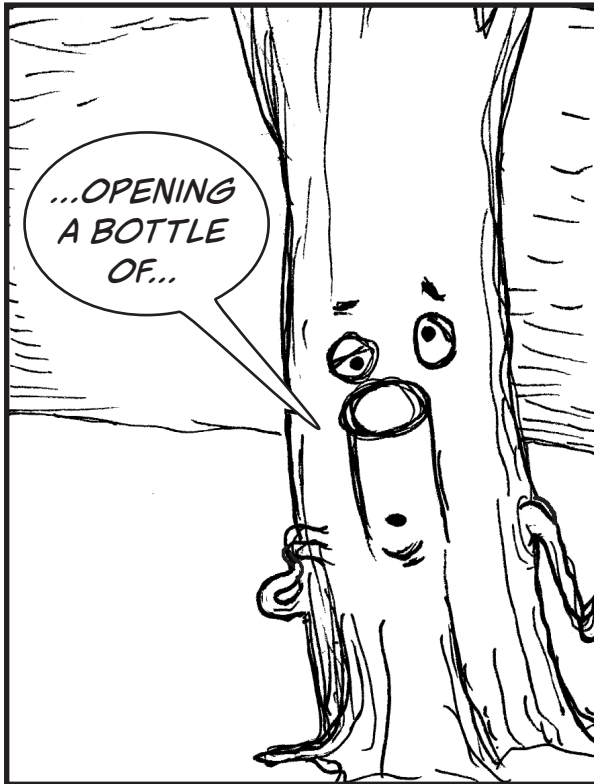
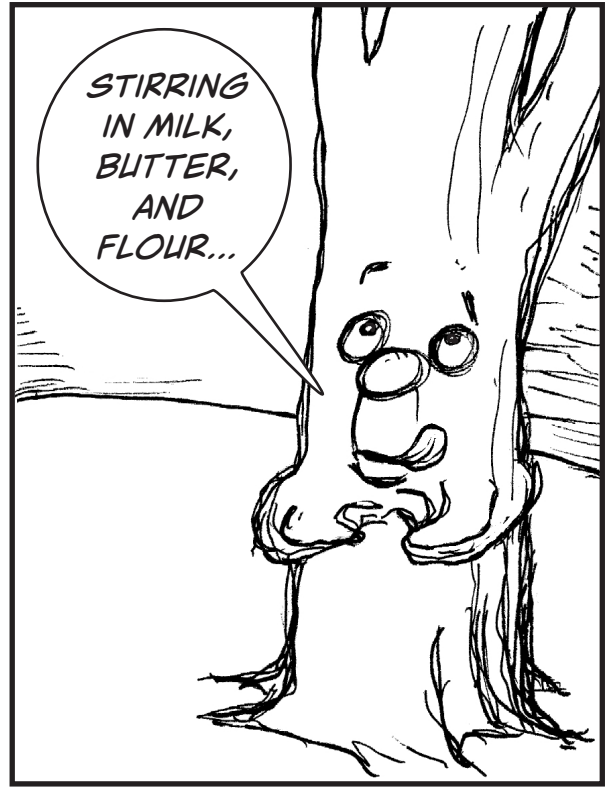
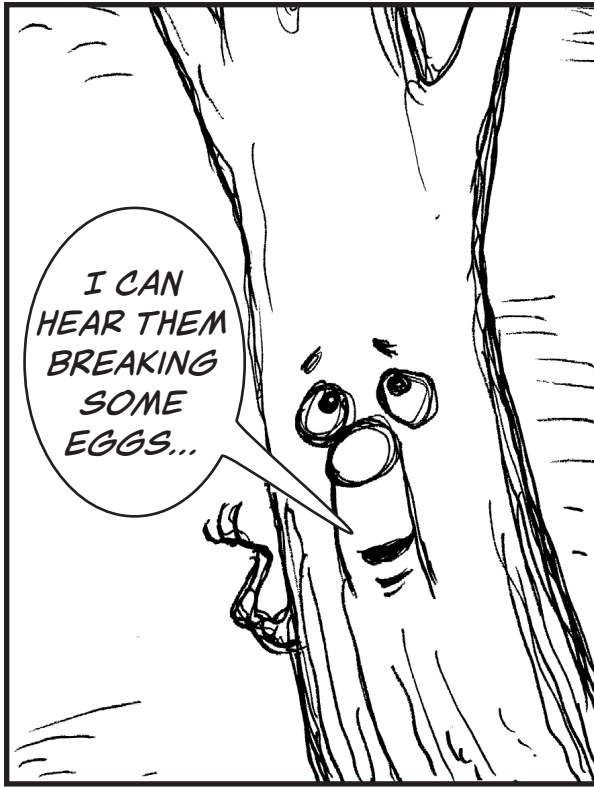
# MAPLE SUGARING

*Abridged*

*Sap to Syrup in Twenty Pages!*

by Kevin Keane

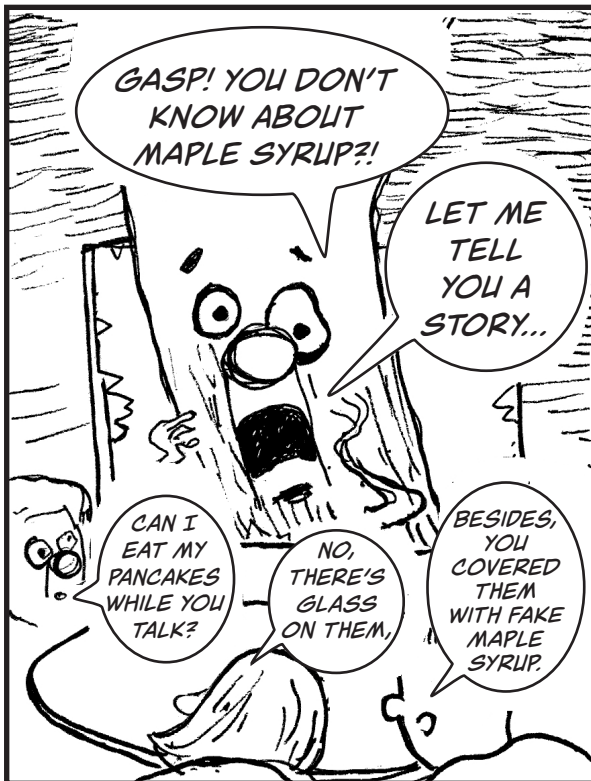
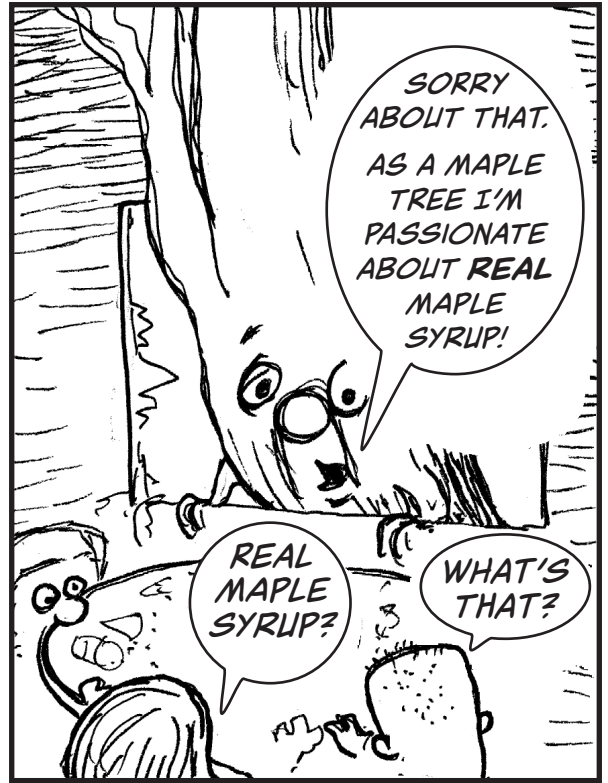
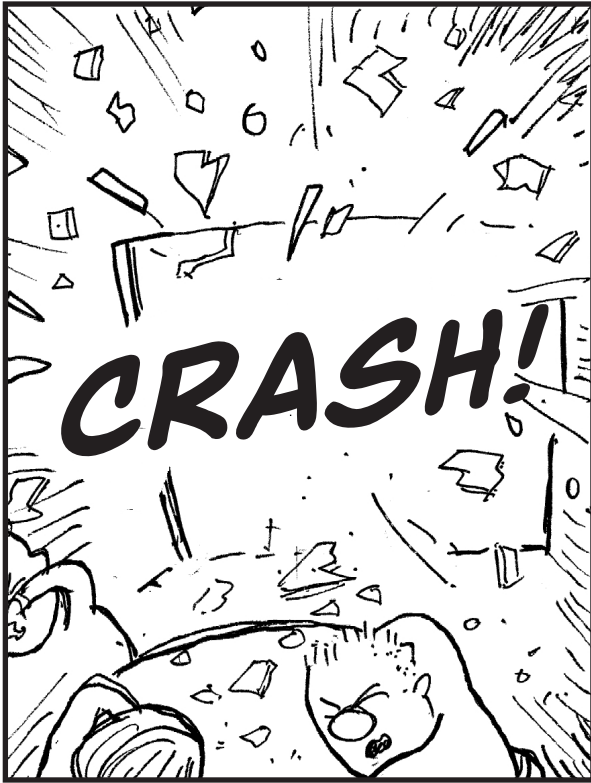












IF A TREE HAS A BROKEN  
BRANCH OR DAMAGE FROM  
A WINTER STORM, SAP WILL  
FLOW OUT.

OVER A FEW  
HOURS IT  
WOULD FORM  
A "SAPSICLE"  
OF SUGAR.

THOUSANDS OF YEARS AGO  
NATIVE AMERICANS, WHO ARE  
ASTUTE OBSERVERS OF THEIR  
ENVIRONMENT, NOTICED THIS.

YUM!  
THIS IS  
INCREDIBLE!

SHOULD I  
GO TELL  
THE VILLAGE  
AND BE A  
HERO?...

...OR  
JUST EAT  
IT ALL  
MYSELF!?

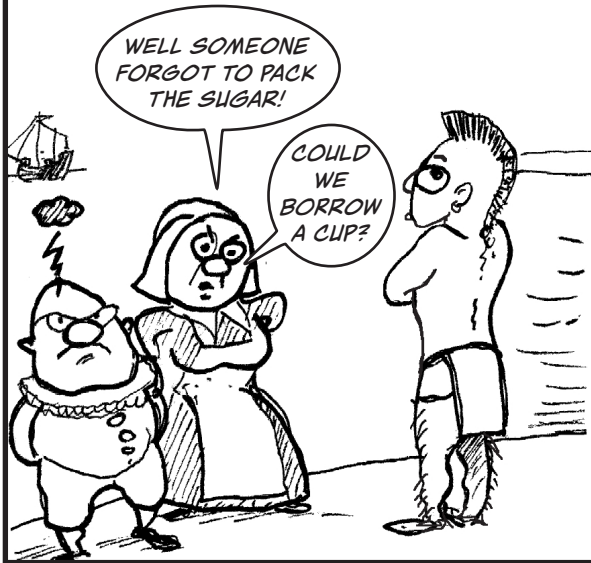
AND THEN  
SOMETHING AMAZING  
BEGAN TO HAPPEN.

PEOPLE  
BEGAN TO  
INNOVATE!

THE NATIVE AMERICANS  
STARTED IT OFF WHEN THEY  
MADE SLASHING DIAGONAL  
CUTS IN MAPLE TREES; IN A  
WAY RECREATING WINTER  
DAMAGE ON A TREE.



WHEN EUROPEANS CAME TO THE NEW WORLD, THE NATIVE AMERICANS SHARED THE MAPLE SECRET.



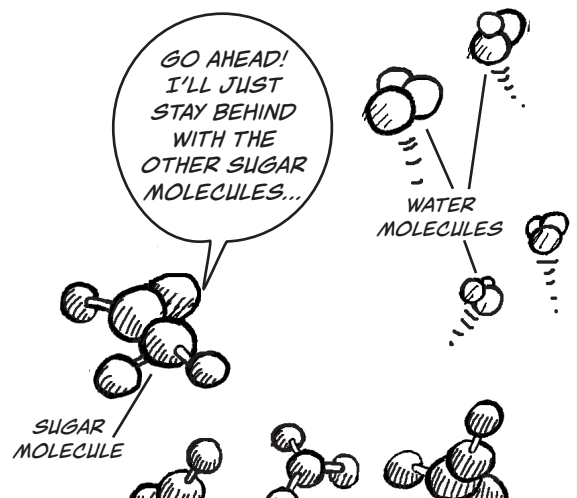
THE SETTLERS INNOVATED TOO! THEY USED DRILLS TO BORE HOLES IN THE TREES, USED "SPILES" TO CHANNEL THE SAP, AND BUCKETS TO COLLECT IT IN.



KNOWING WHAT THEY READ ABOUT PROCESSING SUGAR CANE IN THE CARIBBEAN, THEY BOILED THE SAP IN LARGE KETTLES.



THE HEAT OF THE FIRE BOILS THE SAP. THE WATER MOLECULES FLOAT AWAY AS STEAM. THE SUGAR MOLECULES STAY BEHIND IN THE KETTLE.





**BUT IT'S A LOT OF WORK  
TO CHOP ALL THE FIREWOOD  
NEEDED TO FUEL THE FIRE THAT  
BOILS THE SAP.**

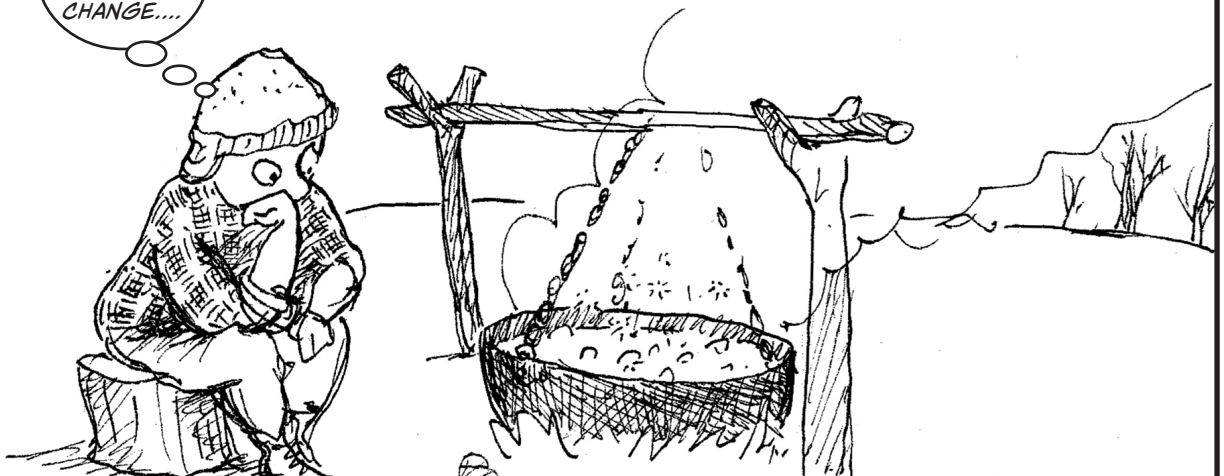


**IT'S A LOT OF WORK  
TO TAP THE TREES AND  
COLLECT THE SAP.**

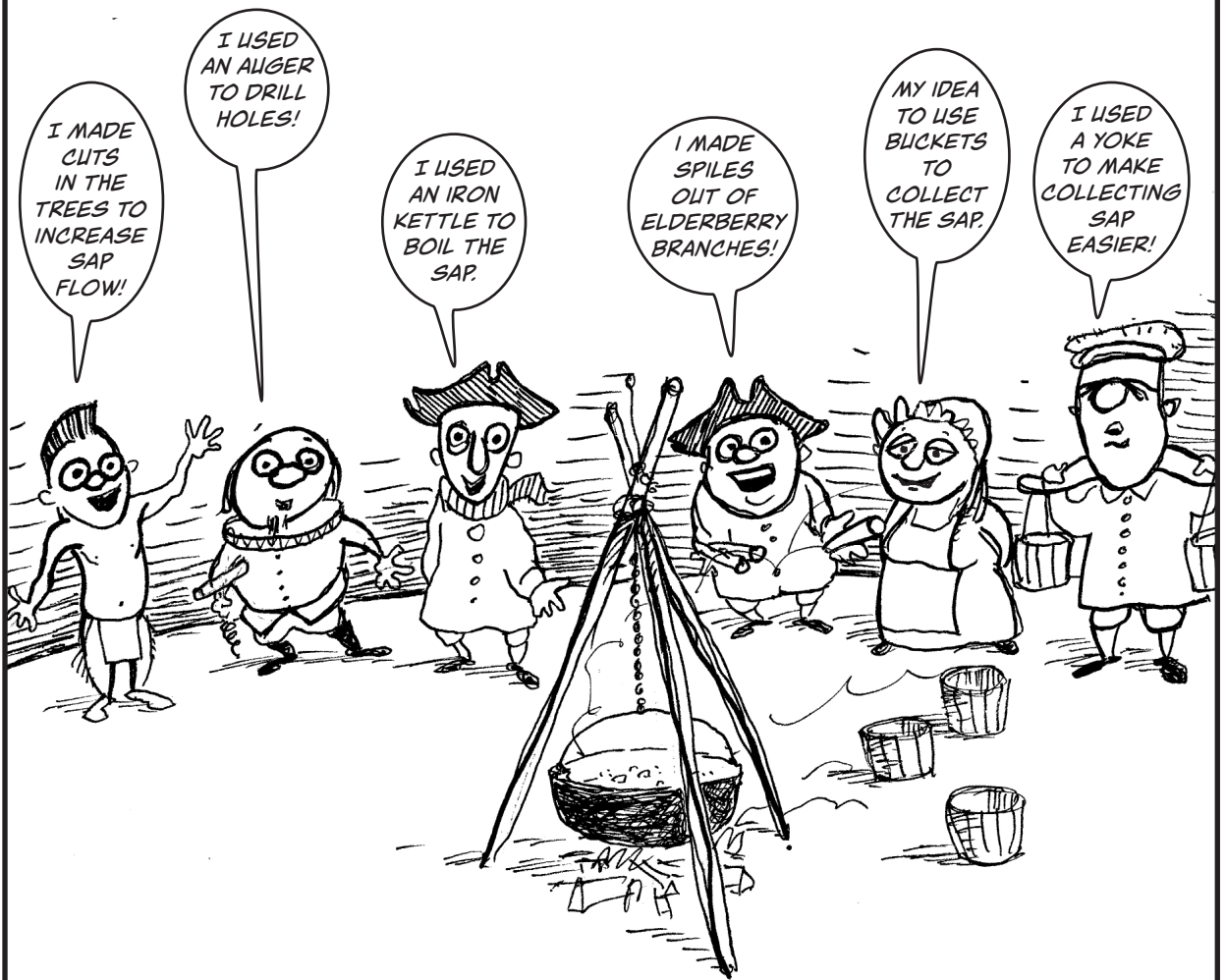


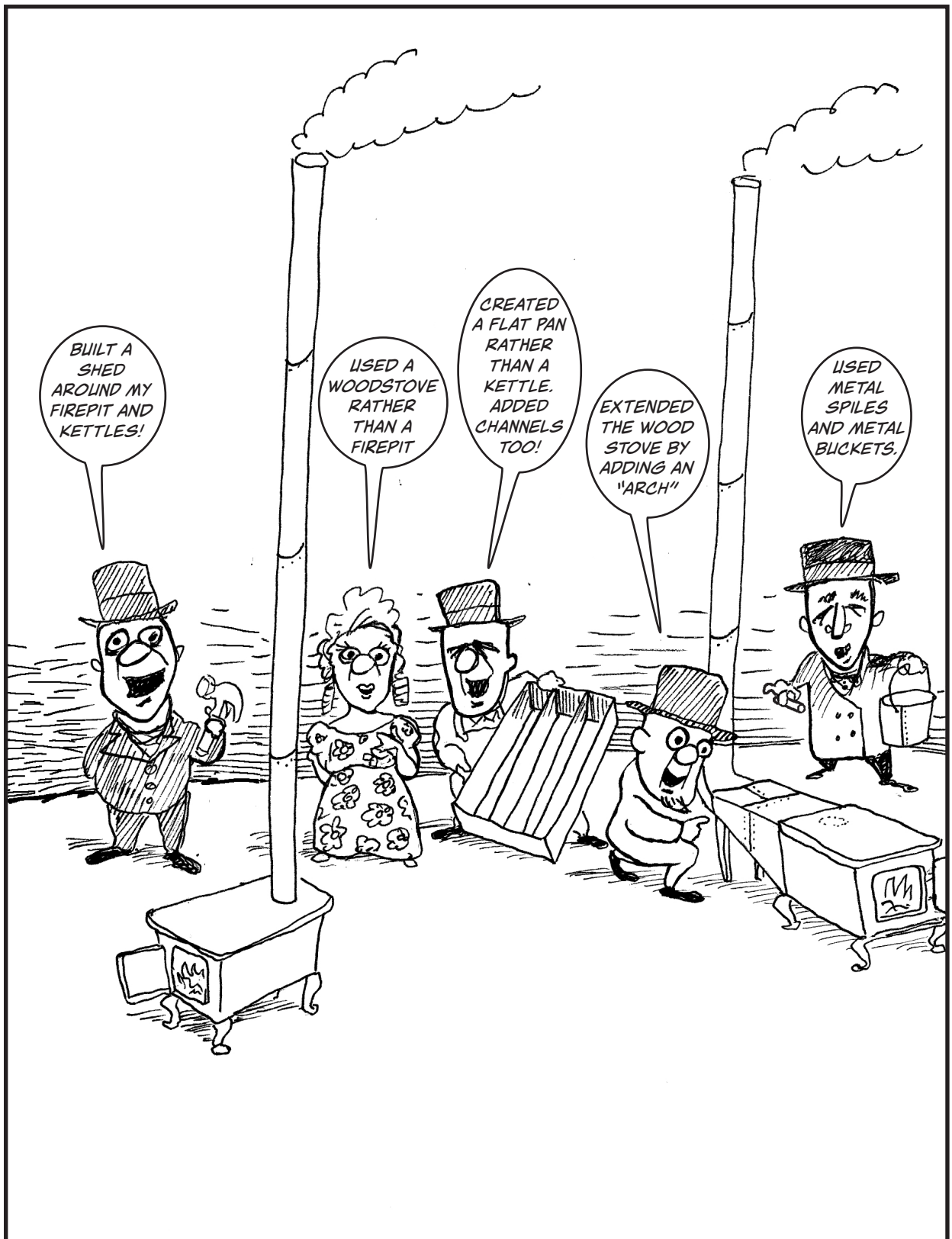
**AND IT TAKES A LOT OF TIME TO BOIL DOWN THE SAP.  
PLENTY OF TIME TO LET THE GEARS IN YOUR HEAD TURN  
AND PONDER: "THERE MUST BE A BETTER WAY!"**

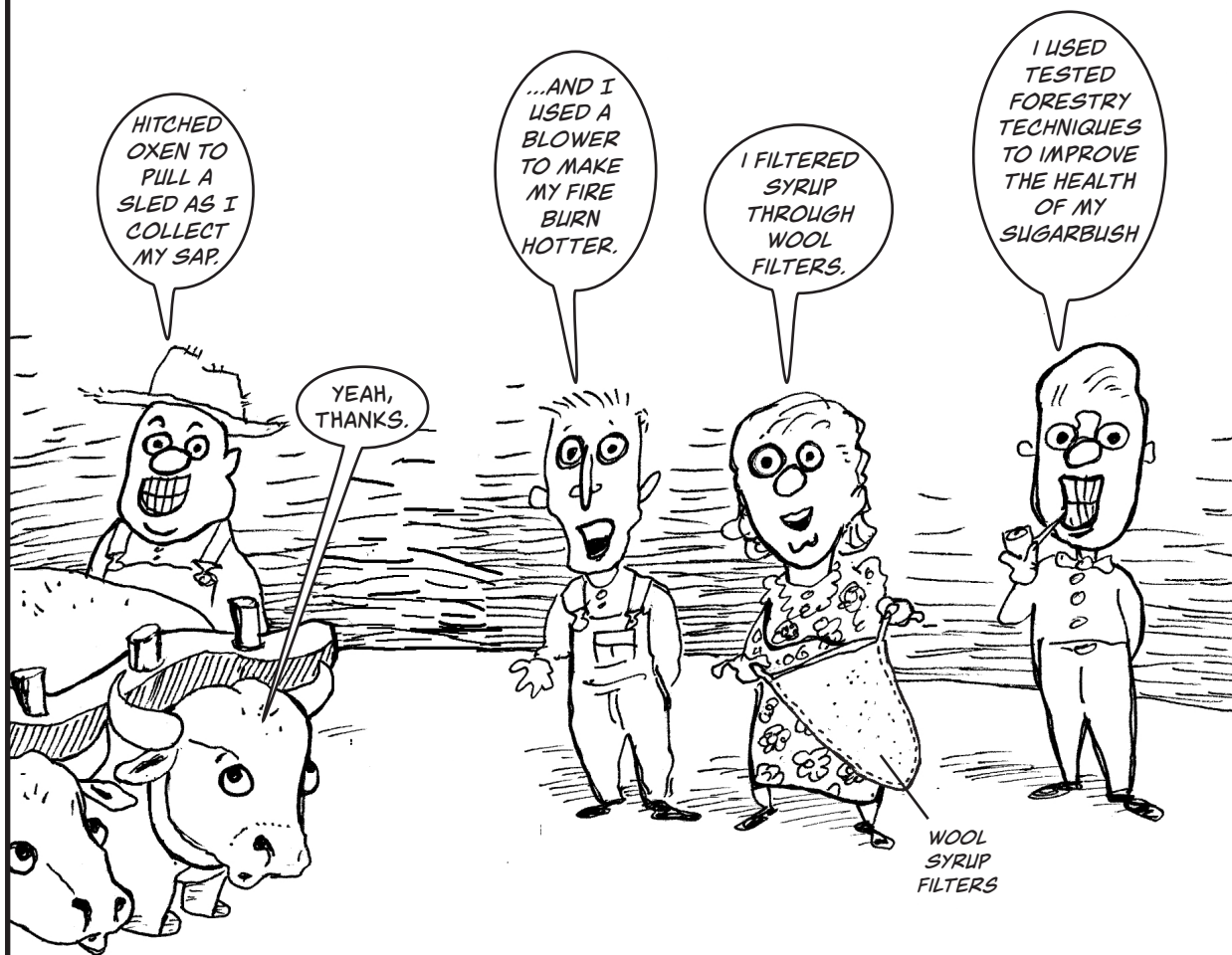
IF I MAKE  
JUST ONE  
LITTLE  
CHANGE....



**THUS BEGAN THE NOBLE  
TRADITION OF INNOVATION!**

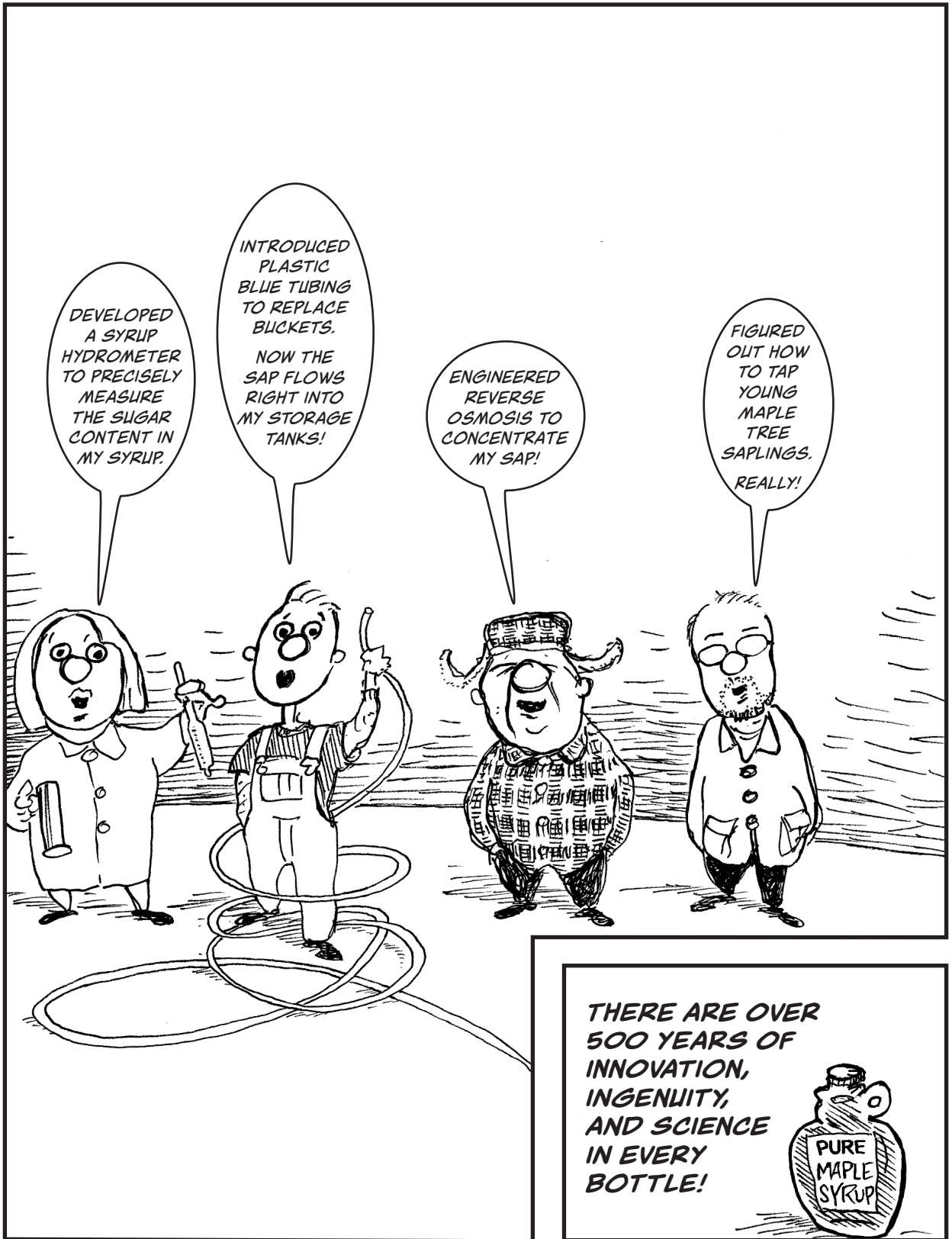


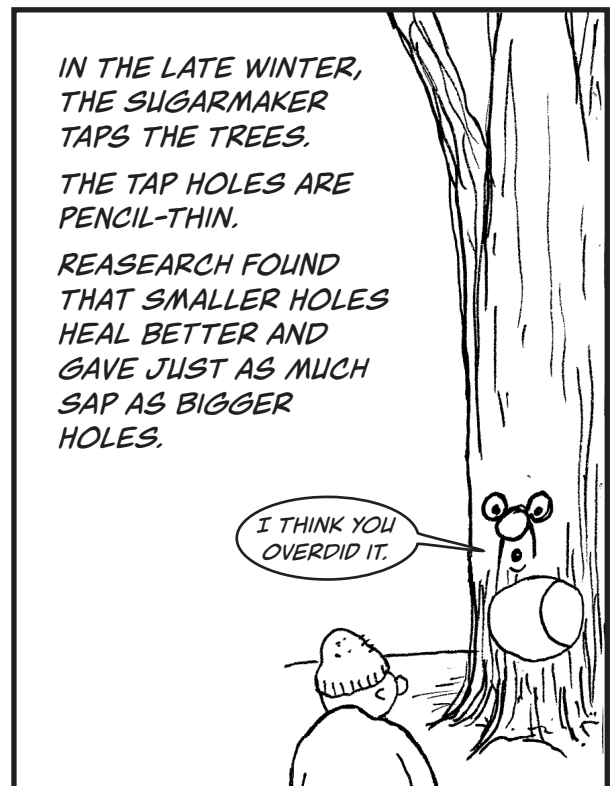
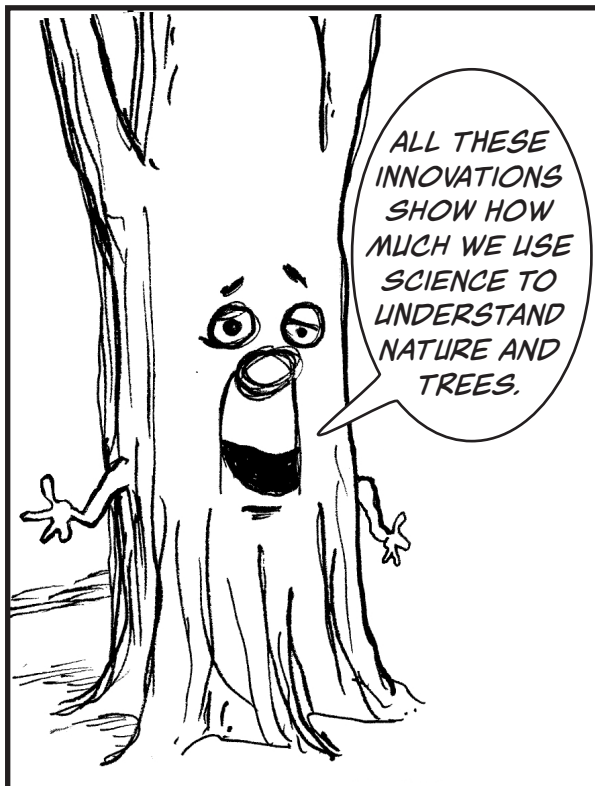
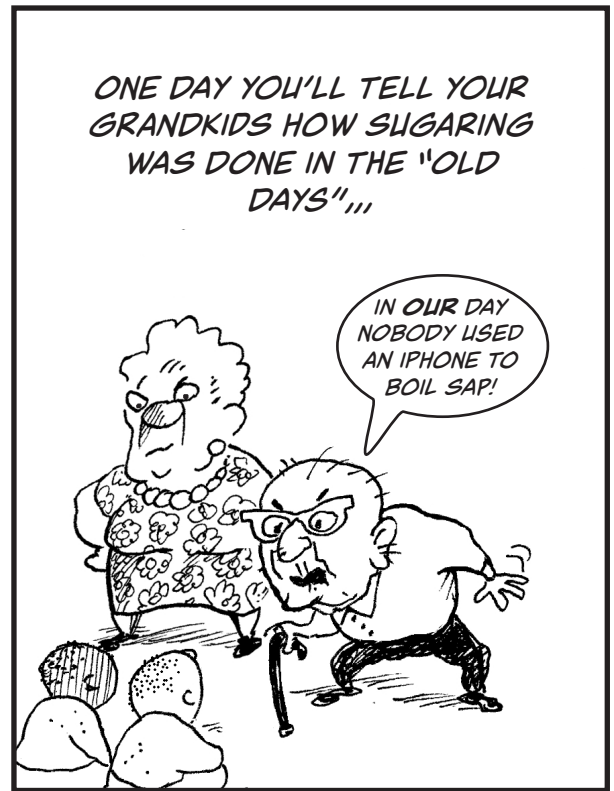




**THINK WE'RE DONE?**  
NOT QUITE! I WASN'T KIDDING  
THAT THERE HAVE BEEN A LOT  
OF INNOVATIONS. TURN THE PAGE  
AND WE'RE ALMOST DONE!







GENERALLY NO MORE THAN TWO TAPS PER TREE. SCIENTISTS FOUND THAT HAVING 3, 4, 5, OR 6 TAPS DID NOT GIVE SO MUCH MORE SAP. TWO IS ENOUGH.

THIS IS ABSURD.

SAP RUNS OUT OF THE TAP (OR SPILE) INTO EITHER A BUCKET OR INTO 3/4" BLUE TUBING.

THESE LATERAL TUBES CARRY ALL THE DRIPS OF SAP INTO A MAINLINE.

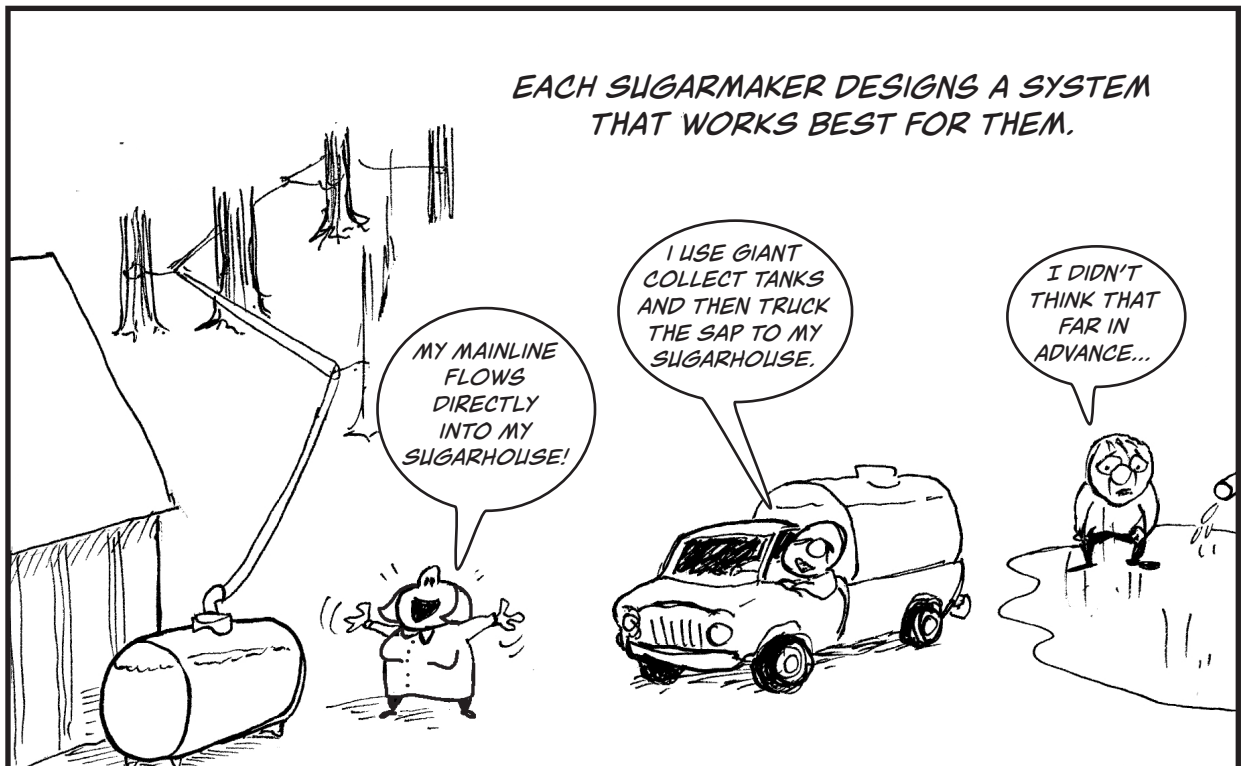
SOON A RIVER OF SAP IS FLOWING OUT OF THE SUGARBUSH.

EACH SUGARMAKER DESIGNS A SYSTEM THAT WORKS BEST FOR THEM.

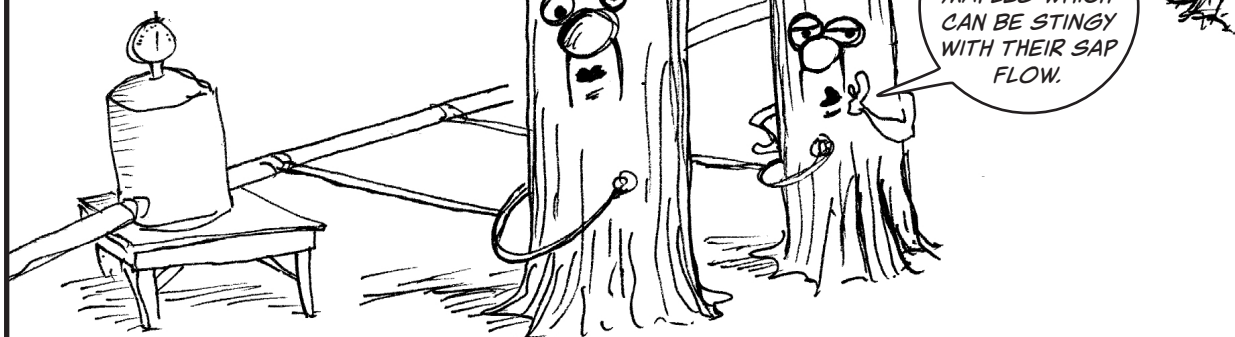
MY MAINLINE FLOWS DIRECTLY INTO MY SUGARHOUSE!

I USE GIANT COLLECT TANKS AND THEN TRUCK THE SAP TO MY SUGARHOUSE.

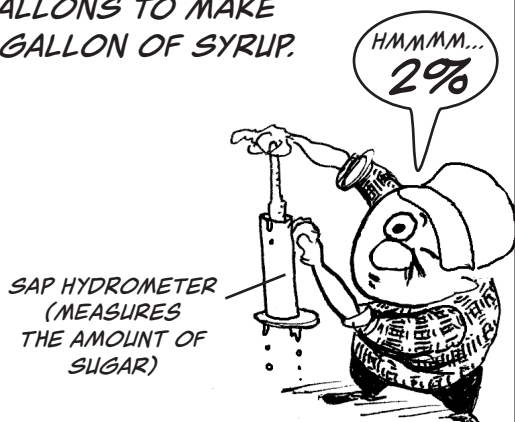
I DIDN'T THINK THAT FAR IN ADVANCE...



MOST SUGARMAKERS ALSO USE A COMPRESSOR, OR PUMP, TO CREATE A NEGATIVE PRESSURE IN THE TUBES. THE VACUUM SYSTEMS IMPROVE SAP FLOW ESPECIALLY WHEN THE FREEZE/THAW CONDITIONS AREN'T OPTIMAL.



SAP OUT A TREE IS MOSTLY WATER. USUALLY THERE'S ONLY 2-4% SUGAR. THAT'S NOT MUCH. THAT'S WHY IT CAN TAKE ALMOST 44 GALLONS TO MAKE A GALLON OF SYRUP.



RUNNING THE SAP THROUGH A REVERSE OSMOSIS MACHINE REMOVES A LOT OF WATER, BUT NOT THE SUGAR.

WITH A MORE CONCENTRATED SAP (AT 10% SUPPOSE), WE NEED ONLY 8.5 GALLONS TO MAKE A GALLON OF SYRUP.

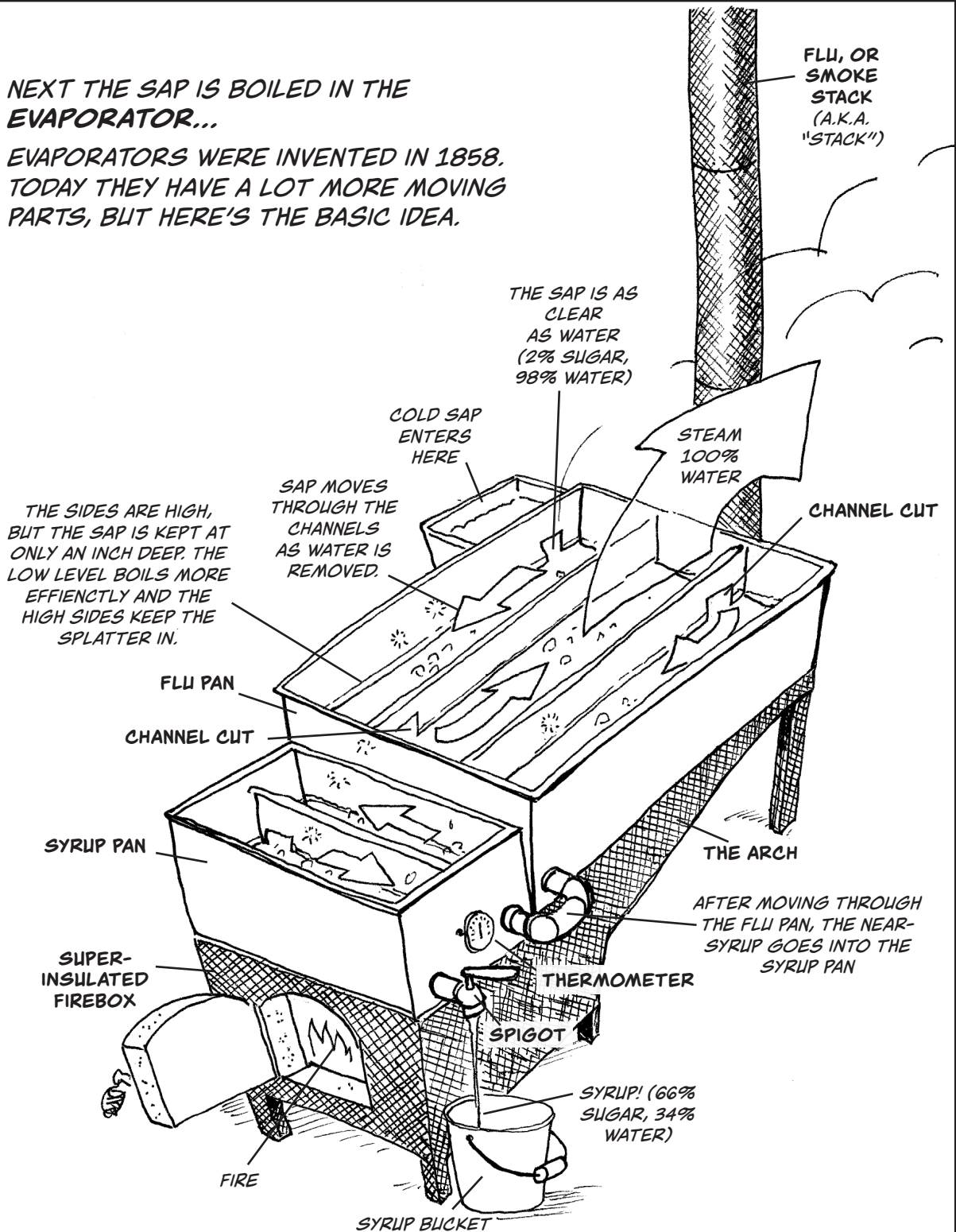
AN R.O. (REVERSE OSMOSIS) MACHINE MAKES THE PROCESS SO MUCH MORE EFFICIENT.

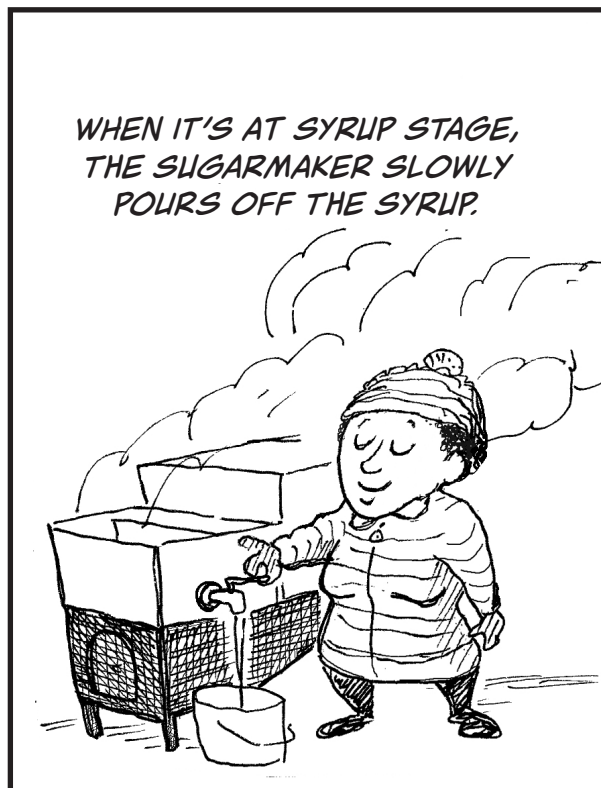
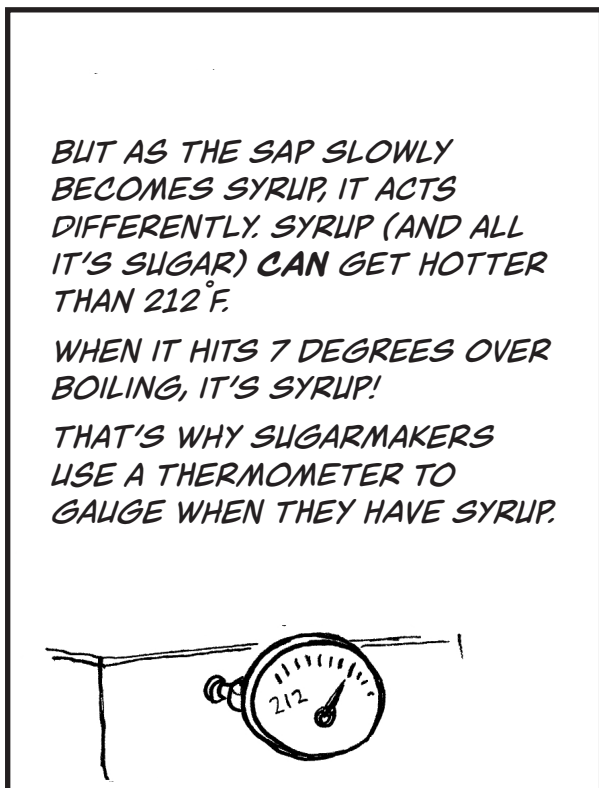
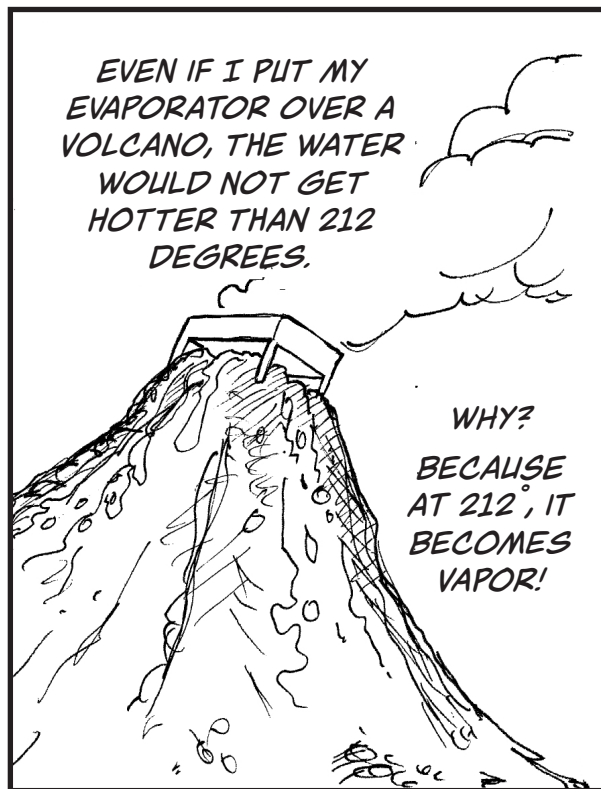
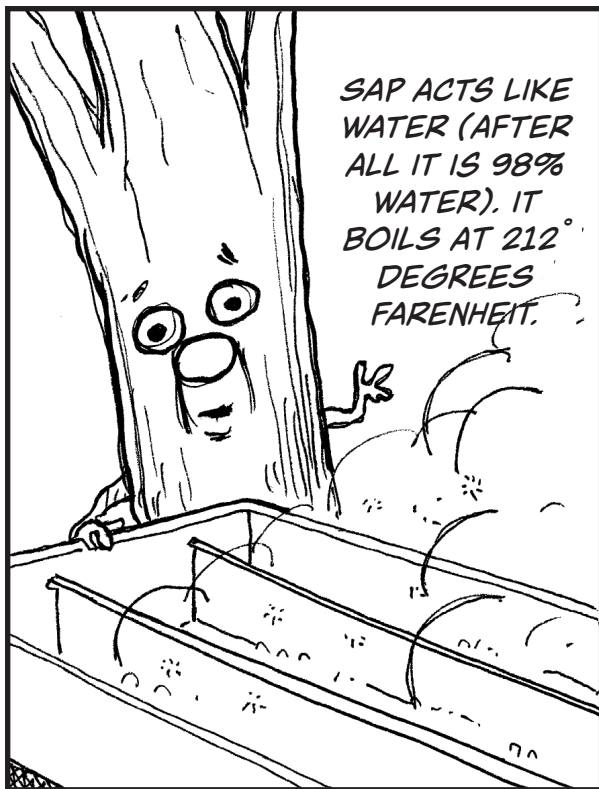




**NEXT THE SAP IS BOILED IN THE EVAPORATOR...**

EVAPORATORS WERE INVENTED IN 1858. TODAY THEY HAVE A LOT MORE MOVING PARTS, BUT HERE'S THE BASIC IDEA.





NEXT THE SYRUP IS FILTERED  
AND THEN GRADED BY  
**TRANSLUCENCY** (THAT MEANS  
HELD UP TO SUNLIGHT TO SEE  
HOW CLEAR IT IS).



THERE ARE FIVE GRADES OF  
MAPLE SYRUP:



GRADE A GOLDEN COLOR  
DELICATE TASTE



GRADE A AMBER COLOR  
RICH TASTE



GRADE A DARK COLOR  
ROBUST TASTE

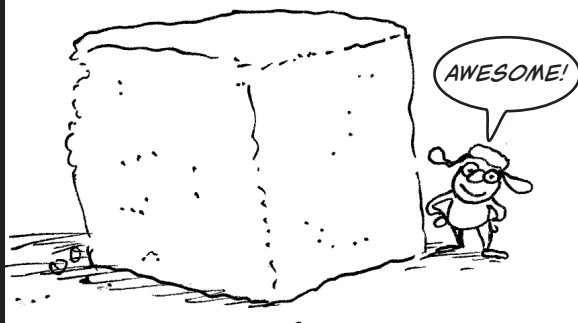


GRADE A VERY DARK COLOR  
STRONG MAPLE TASTE



PROCESSING GRADE

IF A SUGARMAKER WANTS TO,  
THEY CAN REMOVE ALL THE  
WATER OUT OF THE SYRUP  
CAUSING THE SUGAR TO  
CRYSTALLIZE INTO A GIANT  
BLOCK OF SUGAR.

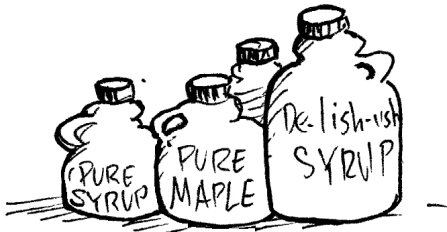


DIFFERENT TREES,  
DIFFERENT REGIONS, AND EVEN  
DIFFERENT SEASONS AFFECT  
THE TASTE.

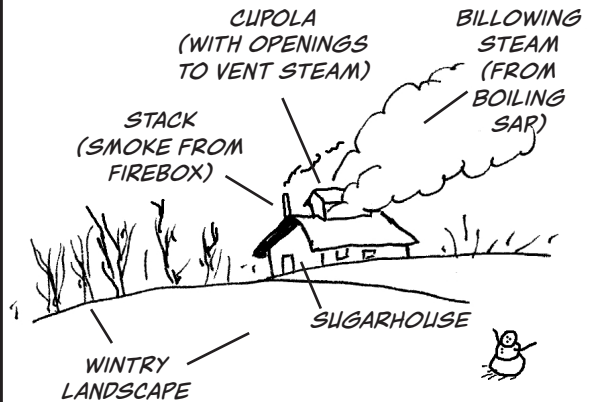
BUT ALL OF IT IS DELICIOUS!



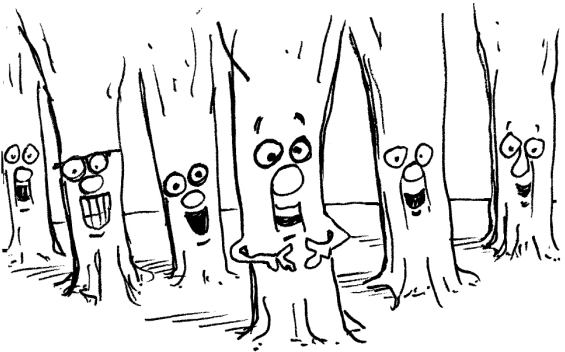
THE SYRUP IS THEN BOTTLED. USING A FINISHING PAN, THE SYRUP IS REHEATED TO 180°, POURED INTO STERILE BOTTLES, AND CAPPED. THIS HOT-PACKING KILLS ANY BACTERIA AND KEEPS THE SYRUP FRESH AND SAFE.



BECAUSE THE SAP-COLLECTING SEASON IS ONLY A SHORT FIVE WEEKS, AND IT TAKES SO MUCH WORK TO CREATE SYRUP, MAPLE SUGAR IS EXPENSIVE.



SOME SUGARMAKERS HAVE HUGE OPERATIONS. THEY TAP THOUSANDS OF TREES. OTHER TAP ONLY TAP A FEW HUNDRED, AND MANY, JUST A FEW TREES.



NO MATTER THE AMOUNT, IT'S FUN MAKING AN AGRICULTURAL CROP IN LATE WINTER.





*SO REMEMBER:*

*THERE ARE OVER  
500 YEARS OF  
INNOVATION, INGENUITY,  
AND SCIENCE IN EVERY  
BOTTLE!*

