

Bonus Chapter 1: Science Project

This is a bonus chapter for the novel, "Born to Storms". It appears only on the supporting Web page.

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Something to Talk About

"Let's do a science project," said Kit, "all three of us." They were at the lunch table in the school cafeteria. There was nothing about the food that demanded anyone's special attention. The sooner forgotten the better.

"I thought that was in the spring," said Sarah.

"The judging is in the spring," said Kit. "You have to start the work in the fall of your junior year. Otherwise, you will not have anything to show. You'll be glad when we have an award to talk about in your college interviews a year from now for sure. If you do not have something good to talk about, they will trip you up with who knows what. Best to do some decent work to control the interviews."

"Yes, I could use some positive things," said Sarah. "Nobody cares very much that you survived two great storms and then the sea sent you running."

"I got plenty of good ideas," said Kit, "what we need to do now is choose one good one."

"JanetA is real good at judging ideas," said Sarah, "coming up with new ideas in the first place, not so much."

"My co-op has an excellent record analyzing ideas. We are paid for this service all the time. Still, new ideas are not really our job," said JanetA.

"I guess that makes me the referee," said Sarah.

Solar Forge

"Okay, you are on," said Kit. "How about the 'Solar Forge?'"

"Got it," said JanetA. "There is an old website with that title."

"Here is the idea," started Kit. "You take an old car frame and build a big solar reflector section on it."

“The car frame rolls around in a circle to track the sun and the reflector tips over. The reflector frame is made of wood and the reflective surface is made from lots of hand-sized, flat, mirrored glass pieces. Even on a less-than-perfect day, it can provide enough heat to bring scrap steel to a bright red for hand forging. Practical and decorative items like fence gates that are ‘forged by the sun’ should draw a premium price.

“What is really cool is that the reflector frame is laid out using the old procedure for laying out sailing ship hulls, called lofting. You can lay the whole thing out using only a compass and straight edge. It is all about drawing lines and bifurcating angles.

“The reflector is connected to the car frame by a heavy wooden structure and barn hinges. If we design it right, we can even trail the whole thing behind a small truck. Now what’s wrong with that idea?”

“You do list some good points,” said JanetA, “but there are some drawbacks too. The idea was originally put forward in 1972 as a demonstration project for solar energy. We are well past the need for such demonstrations. Most people are now convinced of the value of alternative energies.

“The few prototypes that were built never did much more than set two-by-fours on fire. The cost of construction and operation far exceeded the then-value of the fuel saved.”

Sarah looked at the few available pictures with care.

“I don’t doubt that you could build this thing,” said Sarah. “But look at the size of it. We do not have a big barn or something like that to design and build it in. We certainly cannot go running out to your uncle’s farm three times a week to work on it. Sorry, I don’t see this idea working for us at all.”

No-Till Lawns

“All right, all right, we are just getting started here,” said Kit. “How about no-till for lawns?”

“You mean like your uncle’s farm,” said Sarah.

“Yes, just think of all the carbon that could be sequestered in the soil of suburban open areas,” said Kit. “All the lawns, parks, golf courses, and don’t forget roadside margins. The top

soil cannot be more than three percent carbon now and it is not very deep. A target of six to eight percent should be possible and the top soil could be twice as deep.

“Also, the old gas lawn mowers, and there are plenty of them still around, are terrible polluters and the new electrics are just plain expensive. All are dangerous to use.”

“Okay, but what kind of project could we do?” asked Sarah.

“The key piece of equipment is called a drill,” said Kit. “It flattens the existing cover crop into a mat and plants a row of new seeds right through the mat.

“Now, different lawns and public spaces will need different cover plant mixes. Some will need ‘barefoot’ mixes that are a pleasure to walk on, and other places will need a rougher texture. All areas must be able to crowd out noxious plants like ragweed. The rough areas can even have a short milkweed variety just for butterflies.”

“I like the butterflies,” said Sarah.

“I take it that you are going to build this drill,” said Sarah. “What are our parts of this project?”

“JanetA can help me build the drill,” said Kit. “We can design and print out many of the parts with the school’s 3D printer. Some of the parts need to be steel. These we can keep simple and use bits and pieces from our local DIY store. My dad has promised me a couple hundred for a project budget.

“Sarah can lay out a couple test plots, one for rough, one for barefoot. Sarah and I can do the physical work. Mostly just a weekly rollover. JanetA can document our progress.”

“It sounds like you already chose this project,” said JanetA, “but let us all take another look at it before we take off running.

“First, this project is simply more an agricultural and machine design idea rather than pure science. There are a number of different science fair categories that this idea could fit into, but the hard science projects tend to take the big prizes.

“Second, is there time? We effectively only have a few months, and any agricultural idea really needs several years to show proven results.

“On the positive side, a good result will have real value to society; hide that carbon. The design and construction of a small manual device is doable with the resources we have at hand. But, we will also need to use hand tools to get the project off to a quick start.”

“Then it is settled,” said Kit. “Everybody agreed?”

“Okay,” agreed Sarah and JanetA.

“I can have a design sketch for the lawn drill by Monday,” said Kit.

“No need,” said JanetA, “I will have the design sketches, 3D printer program, and parts list by end of school today.”

“Even better,” said Kit.

The Crusher

They all got to work. JanetA churned out drawings. Kit called his uncle about what seeds they should use. His uncle offered to provide two appropriate seed mixes.

Kit then scheduled time on the school’s 3D printer, but there was not enough of the plastic feed line on hand so he had to order that. Besides, he wanted many more and brighter colors. A joint trip to the local DIY store yielded steel rods for the axles, copper pipe for the bearings, steel bars for the crusher rollers, and a large assortment of washers and fasteners.

Sarah got permission from the other people living in their building and laid out two test plots in the backyard. She drove in wooden stakes and delineated the plots with string. They elected to do little to the existing plants, mostly grass and low weeds, as they wanted to show any problems in the transition. They also blocked all mowing of the two plots for the duration of the test.

At JanetA’s suggestion, they took core samples of the starting soil and sent them to the county agricultural office for determination of carbon content. This was now a common test used in a number of efforts to compensate farmers for increases in the carbon stored in their soils. JanetA made a photo document of the initial state of both patches.

The crusher feature of their drill was straightforward. It had eight cylinder rollers 100 millimeters in diameter and 140 millimeters wide. The bodies were 3D-printed plastic, the bearings were a piece of copper pipe, and the eight blades were steel bar stock hand-cut to

length. Kit spent all night hacksawing the bar stock and then burned his hand hot-gluing the metal parts into the 3D-printed roller bodies.

The drill base was a piece of plywood with numerous 3D-printed parts screwed on. These were colored a dark green. The handle was made of steel tubing and wood. It was black and could be easily removed for transport. The rollers, however, were bright orange. Sarah had not been present when that material was ordered.

At that point, they had a progress meeting.

“We now have a manual crusher,” said Kit. He was pushing what looked like a cross between a lawn mower and a torture machine up and down the garage floor. It made a low rumbling sound on the concrete floor as it rolled.

“The problem is with the actual seed drill. JanetA has done several designs, but the easy-to-build ones probably won’t work, and the complex ones would not be ready before spring.”

“What is the workaround?” asked JanetA.

“We manually plant the seeds,” said Kit. “We roll the existing plants, cut lines with a shovel, drop in the seeds, and roll the cuts close.”

“And that will get my plots started while you two refine the drill,” said Sarah.

“Yes, with two of us working, we should be able to do both plots in a couple hours,” said Kit.

“Saturday?” said Sarah.

“Saturday,” agreed Kit.

The Patch

The first attempt at crushing the existing plants did not work well. JanetA suggested that the problem was the missing weight of the seeding parts. Kit found a half sack of sand to weight the crusher down and the result was much better.

Kit crushed the existing plants. Sarah laid out string lines at three-quarters the width of the crusher and made a cut with a shovel. Kit went down the strings dropping seeds into the cut. It was Sarah that then rolled the crusher over the plots to close the seed cuts. JanetA documented the whole thing.

It was then time to wait. Every two weeks someone rolled the crusher over the plots and documented the progress. Between uses, the crusher lived in Sarah's back hall, where it was definitely in the way. They had no better place to store it and its construction really would not have lasted if left out in the weather.

The snow was light that winter and the cover crops grew well, if slowly. At one point, they found deer droppings on one plot and some of the plants had been browsed. No harm was done, but Sarah insisted that the offending material be removed before the crusher rolled over it.

The month before the contest, they took another set of cores and sent them off for testing. The last round of crushing and documentation followed.

"We better do a barefoot test too," said Kit, after he had removed the deer droppings. "I'll hold the camera for JanetA," said Sarah. "You can be the foot model."

Kit then sat down and removed his shoes. He then proceeded to walk up and down, crossing the boundary between the plots several times.

"You can definitely tell the difference," said Kit. "The barefoot patch feels like heavily mulched garden. There are definitely mown lawns that feel better, but I have felt worse.

"The rough patch can definitely feel unpleasant at times. I included some wildflower seeds, including a species of milkweed for your butterflies. You definitely want to wear shoes of some sort here."

"Not a walk on the beach then," said Sarah.

"Well, no," admitted Kit.

"If you want a beach, we will have to add much more sand," said JanetA.

Naval Story

One sunny day when they were working the plots, Kit suddenly said, "I have a story for JanetA's files."

"Okay, shoot," said JanetA.

"This one's from my father, Chief Petty Officer Kenneth B. Jones, United States Navy. I mentioned that you record people's stories and he came up with this one immediately.

“It seems back when the virus pandemic was just getting started a few years back, the people under him were getting upset about this ‘invisible enemy’ thing. Military people need a clearly defined enemy to fight.

“His commanding officer came up with just two lines from a more-than-two-hundred-year-old poem:

Tyger Tyger, burning bright,
In the forest of the night;”

“Yes, the poem is by William Blake, 1794,” said JanetA. “‘Tiger’ was spelled with a ‘Y’ at the time.”

“The officer then went on to say that the Tyger was the disease. If not controlled, it would burn like a great fire through the ranks. The forest were the sailors all crowded together on their ships. And, the night was our inability to see anything.

“These few lines of a poem then gave them a formidable enemy to fight, the Tyger. A Tyger is a worthy enemy in anybody’s book.

“Given an enemy, there were actions they could take, like spreading out the forest until it was more of a savanna with room to work all around.

“And, testing then let them light up the night and made effective action possible.

“Once our people had this clear definition of the fight they were in, they got to work fighting it as a team. My father is sure that poem saved many lives.”

“Thank you,” said JanetA. “That is a good story for my log.”

Judgment Day

The science fair presentation had to be three-fold. It required a table and backboard presentation that was set up at a county school. The exact same presentation was required as a webpage. Finally, the students had to appear in a video presentation with Q&A from the judges. JanetA saw the video requirement as an opportunity.

The last set of carbon tests arrived only two days before the presentation was due. There was some improvement in the carbon in the soil but nothing very impressive.

Sarah and JanetA took over making the presentation. Kit wanted to include the crusher but it was too big for the allowed table space, so he had to settle for the front set of well-used rollers. In the end, the presentation looked professional, but they were woefully short of data.

They waited in a line of all the local presenters for more than an hour. Then it was their turn.

“Jump,” said JanetA.

Sarah was the designated presenter, but she was distracted by an image on the main monitor that had been set up for the crowd to watch. There were now three people in the shot. JanetA was once again dressed in feathers, this time more a business suit than a dress. The color was the vibrant green of a parrot with just a streak of red accent through the head crest. Sarah was being upstaged by her own symbiont, again.

Sarah stumbled through the presentation. JanetA said nothing but simply pointed with her hand at each section of the presentation as Sarah progressed like a game show preenter. Kit was having trouble suppressing giggles. Still, Sarah did manage to answer most of the judge’s questions clearly and succinctly.

Not Winning

That evening they waited around for the results. They took a second in their category but did not move up to the national round.

“Do you think they were biased against our AI?” asked Kit.

“Not likely,” said JanetA, “I checked out the winners. They were very good. We would have had to have had at least two full years of data to compete successfully.”

“I’m okay,” said Sarah. “A second is something good to talk about for a few seconds in a college interview, I guess.”

“I’m okay too,” said Kit. “I’m planning to go to agricultural school, and my documented projects on my uncle’s farm are more important. I will probably do a couple years in the military first anyway.”

“Will you keep the patch going?” asked Sarah.

“Yes,” said Kit, “another year or so will give me more good stuff to talk about.”

“Let me know when you need documentation,” said JanetA.

“A little gardening work in the spring won’t hurt me either,” said Sarah.

“It’s time to put in a new seeding,” said Kit. “I will let you know when everything is ready. Moreover, I will try to find a better place to store the crusher. I know you keep tripping over it.”

“I do not,” said JanetA.

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**(End of Bonus Chapter I)**