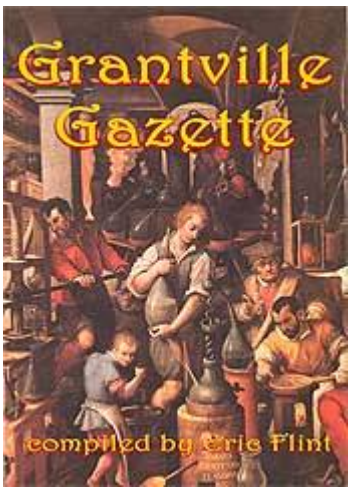
Grantville Gazette

Volume Six



A Baen Books Original

Baen Publishing Enterprises
P.O. Box 1403
Riverdale, NY 10471
www.baen.com

DOI: 10.1125/0016

First electronic printing, March 2006

Production by WebWrights, Newport, TN

EDITOR'S PREFACE

Volume 6 of the*Gazette* is coming out three months later than we'd projected. There are three reasons for that, which are closely connected. The first reason is that our copy editor fell behind, for various reasons including some health problems. The second reason is that she's also one of the copy editors for Baen Books, with many other assignment. And the final reason is that the launch of the new online magazine,*Jim Baen's UNIVERSE,* further complicated the situation because the*Gazette* 's copy editor is now also one of*JBU* 's copy editors.

To put it another way, the*Gazette* was the runt of the litter.

On the bright side, the long delay due to production problems also means that the editorial staff of the

magazine is way ahead of the game. We've pretty much got the next volume already put together, and most of the one that comes thereafter. From a purely editorial standpoint, therefore, we could publish Volume 7 very quickly, and Volume 8 soon thereafter.

However...

We'd likely run into the same bottleneck and logjam with the process of copy-editing and proof-reading. The tie-up with Volume 6 was not the first time that's happened, and it's very likely to happen again. Being the runt of the litter is never any fun, and, alas, the runt is what the magazine shall remain.

Facts are stubborn things, and it's just a fact that while the paper editions of the*Gazette* generate a significant income for Baen Books, this electronic magazine does not. Yes, yes, granted—it's the root source. But publishers are no different from you or me or anyone else, when they are faced with that nastiest of all nasty eight-letter words:

Cash flow.

Okay, it's two words. But, as everyone knows, they roll right into each other, like a mudslide approaching a town of people who have their budgets neatly in order. Abstractly.

In a pinch—and there's always a pinch in publishing—the work of copy-editing the electronic edition of the*Gazette* keeps getting pushed aside in favor of other, more financial pressing projects. So it has been, and so it will continue to be.

There's only one way to solve this problem, and that is to boldly go where...

Well, actually, where Baen Books has been going for years now. Henceforth—beginning with Volume 7, not this one—we are going to start publishing the electronic edition of the*Gazette* the same way Baen publishes e-books through Webscriptions. Using the same basic approach, at least.

We'll simply put up the volume for sale as soon as the editorial staff has it ready—except we'll put it up all at once, not serialized across three months the way Webscriptions does. But, like Webscriptions, we will produce the final copy-edited version*after* the volume goes up for sale.

How soon thereafter? I don't know. Unlike Webscriptions, we can't guarantee that we'll have it ready within three months. But it shouldn't generally be much longer than that—and, as with Webscriptions, anyone who has paid for the magazine will automatically get the later, copy-edited version free of charge.

Mind you, the text will have been proof-read, at least once, before we put it up for sale. We're not going to be putting up raw text. But "proofing it once" is not the same thing as the normal, time-consuming, and very laborious process of copy-editing, querying authors, and two rounds of proof-reading that is standard practice in commercial publishing for paper books.

But that's really the key:*paper* books. Publishers*have* to put the time and money into copy-editing and extensive proof-reading before they produce a paper edition, for the good and simple and obvious reason that once tens of thousands of printed and bound volumes have appeared on the shelves of bookstores, it is effectively impossible to call them back.

That is not true, however, with an electronic edition. Molecules are not electrons—and electrons respond just fine to a recall notice. With electronic publishing, the difference between "in production" and "in print" is a continuum, it's not the Chinese Wall that it is in paper publishing. It is perfectly possible to

keep making corrections in a text after it's been made available for public sale. With the proviso, of course, that you have to make sure your customers are informed of that.

You are hereby informed—and we will repeat the information regularly.

If any reader spots a typo or what they think is an error, and has the desire to do so, you can inform us in any one of three ways:

1) Send an email to Paula Goodlett, at: paula@1632.org

2) Post a notice to that effect in the 1632 Tech Manual conference in Baen's Bar.

3) Post a notice to that effect in the 1632 section of the discussion area in my own web site: http://www.ericflint.net/forum/

On a periodic basis, we will incorporate the corrections. (Assuming the reader is right, anyway. Not all "errors" are actually errors.) And, of course, we will replace the existing edition with the copy-edited edition when that finally becomes available.

Granted, it's not an ideal solution. But it seems a far better one to us than continuing to have the magazine delayed for long stretches of time by purely production problems.

* * *

One final note. In terms of the editorial work, this volume 6 is a transitional volume. Paula Goodlett and I co-edited it, essentially. Beginning with Volume 7, however, Paula has become for all practical purposes the editor of the magazine, not me. I say "has become" rather than "will become" because the transition has already happened. When I said toward the beginning of this preface that "we've pretty much got the next volume already put together," I could just as easily—and considerably more accurately—have said that Paula has pretty much got the next volume put together.

Henceforth, starting with Volume 7, she will select the stories, she will edit them, she will make all final decisions regarding the magazine except whatever few decisions might need my overall input. My own position with the magazine will no longer be "editor" in any real sense of the term. I will simply be what amounts to the publisher. Yes, I retain final control over the magazine and, yes, I'm the one who writes the checks. But, like any sensible publisher, I will leave the regular operation of the magazine in the editor's hands. If I didn't have confidence in Paula, I wouldn't have asked her to do the work in the first place.

Mind you, that reality might not be reflected in the official titles in the masthead. I don't want to use the term "publisher" officially, because it's a complicated situation, in that the magazine is distributed through Baen Books even though it's independently financed. That doesn't matter much with regard to the electronic edition, but it would become an obvious problem if any electronic edition of the*Gazette* wound up—as the first three now have—being produced in a paper edition by Baen Books.

Jim is the publisher of those editions, not me, because what ultimately defines a "publisher" is that he or she is the one who pays the bills to get a volume produced. I pay the bills for the electronic edition—one of which is the commissions I pay Webscriptions and Baen Books to use their existing electronic outlet—but Jim pays the bills for the paper editions.

It would be more accurate to label my position with the magazine from now on as something like "chairman of the editorial board" or "editorial director" or... whatever. In practice, I suspect we'll just keep using the term "editor" for me and "assistant editor" for Paula.

Why?

Well, because it's time to introduce you to the nastiest nine-letter word in the English language:

Marketing.

If you didn't know already, producing Immortal Prose, from the commercial standpoint, is not much different from producing sausages or 1/4-20 nuts and bolts. It's just a fact that the names that get plastered on a cover make a difference in terms of how many copies distributors and major retailers order to begin with.

No, that's not a big problem with an electronic edition. But we always have to keep an eye out for a possible later paper edition.

That said, "marketing" is what it is. A nine-letter word that you take seriously enough, in its own terms—but nothing more than that. The best depiction of marketing in the English language, that I know of, are the following words of wisdom from "Jabberwocky" by Lewis Carroll, the author of the Alice in Wonderland stories:

Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogoves,
And the mome raths outgrabe

Those same words—albeit not as brilliantly—could have been penned by any marketing department in the world since the advent of generalized commodity production, lo these many centuries ago.

Eric Flint
March, 2006

STORIES

A Taste of Home

by Chris Racciato

It was raining. Daphne Pridmore was getting thoroughly sick of the rain. It meant that she had to stay inside for the most part. Going out to check on the hives was pointless. If they could use the truck, it might be worthwhile, but they'd decided to save the wear and tear on their only truck for emergencies. As much as she hated to admit it, cabin fever wasn't a real emergency. If she really wanted to go out, it would mean getting the horses hitched to the wagon. And driving the team in the rain. And dealing with very agitated bees, who would be less than amused at the stupid human who wanted to bother them

when they were all snug in their hives. Even the bees knew when to stay inside.

Noises occasionally filtered up from the basement. Ikey, her husband, was no doubt puttering down there with one of his many projects. Everybody else was gone for the day. The kids were at school, both hers and those of the families living with them. If the rain didn't let up between now and the time they got out of school, the kids would end up going to her brother-in-law's house for the night. She missed having Zeke and Evie living with them, but it was nice to have a place closer to town for the kids to stop in at. Several of their down-time boarders were out on a route collecting honey in the caravan and wouldn't be back for a few more days. The caravans had been built with exactly this kind of situation in mind. The large wagons held all the comforts of home and enough supplies for a couple of weeks. The seventeenth-century version of an RV. She listened to the rumbling thunder and hoped they were all okay.

She wandered around the house looking for something to do. Eventually she ended up in one of the smaller upstairs bedrooms. At one time it had been Ikey's grandmother's sewing room. Now it was the repository for all of the oddball projects that they had worked on over the years. There were scraps of leather in various states of being tooled or made into different items. Boxes of fabric were bulging out of the closet, often spilling their multihued contents over the ones below. A lone spinning wheel sat abandoned in the corner, covered with dust and strewn with pairs of hand-dipped candles. In short, it looked like a craft store had been caught in a tornado and then had all of its contents dumped in the tiny room. Daphne spotted one of their project books peeking out from under a macramé plant hanger. She picked it up and thumbed through it. It listed all of the things on their "To Do" list, month by month. This one was from a year before the Ring of Fire. She smiled as she read it to herself. So much had changed.

1) Clean fireplace

2) Clean out car

3) Finish spring quilt

4) Go shopping for groceries

5) Drop Mariah with Grandma Mamie and have movie night . . .

The more she read, the more homesick she became. Here was her life, written down on paper. The week by week retelling of what had been an ordinary life in a small town. She thumbed a few pages ahead. It was the same. Some of the items were different, but there was so much that they couldn't do now. Tears welled up in her eyes as she went through page after page of what they had considered important enough to write down at the time. So much of it was meaningless to her daily life now. How could she worry about getting oil for her car when there was no gas to run it? Or go to a Renaissance Faire, when they were living in a time that was scant decades from when Shakespeare wrote his plays? The tears started rolling down her cheeks as she went through May, June, July . . .

A small note in the end of July caught her attention. It was scrawled in Ikey's handwriting "Check on peppers, add salt if needed." It took her a moment to figure out what he was writing about. Then it hit her. That was the summer they had grown so many peppers that they didn't know what to do with them all. They had found an article talking about Tabasco sauce, and decided that it would be fun to try. They

had filled up one of Ikey's wooden five gallon barrels with the pepper and salt mixture. Then they had put it away to ferment. It was right before Ikey's dad had been in a car accident. Daphne quickly flipped through the remaining pages. There was no mention of them bottling the sauce. Nor could she remember ever finishing them. That meant they might still be around someplace, assuming that Ikey hadn't thrown them out.

It had been over a year since the last of their Tabasco had run out. Many of their other up-time spices were gone as well. There were many other things that they could get down-time. Herbs were the easiest, either from their garden, the local markets, or trading with another up-timer who was growing something they didn't already have. Even bay leaves and several kinds of ginger could be found if you knew where to look or who to ask. Salt was easy to find as well. And there were many new things that she would have never considered as spices, like juniper berries and rue. But when it came to adding heat and flavor to dishes, they were severely limited. Curry powder was unheard of. Black pepper could be found, at exorbitant prices. True, they had plenty of chili peppers, but every time she had used them when it was her turn to cook, the down-timers complained about the food being too hot. She put them on her own food, but for the most part they added more heat than flavor. The mere thought of Tabasco sauce was enough to make her mouth water. She tossed the book back on the corner of the table and headed for the basement. If the peppers were still around, Ikey would know where they were. He had barrels of stuff stashed all over the place from brewing and was notorious for not putting labels on anything, so the only way to track them down was to go find him. She wiped away the tears and hurried off. She was a woman on a mission. Her day was looking up.

* * *

Locating Ikey wasn't an overly difficult task. One simply had to go down the stairs and follow the sound of banging. That usually meant he was at his workbench tinkering with one of his gun projects from the store. This time was no different. He had his back to the door, and was prying on something with a large wrench. Daphne paused for a moment to consider the best way to approach him.

"Honey, dearest, snookums?" she asked sweetly.

"Uh-oh." He turned cautiously. "What am I going to be doing for you this time?"

"Oh, nothing major, dear. I just need you to help me find something."

"Uh huh," he said noncommittally. Daphne knew he was trying to figure out the best way to escape from the basement. Fortunately, she was between him and the stairs. And there was no way for him to make a dash for the storm doors without being incredibly obvious. There was no helping it, he was well and truly trapped. "Ummm . . . What do you need me to find?"

"Do you remember the barrel of peppers we were going to make hot sauce out of a few years ago?" When he nodded, she continued. "Do you have any idea where that might be?"

The relief on his face was almost comical. "No problem. It's up the hill at the old house. I think I put it in the basement next to some mead and cysers. Why?"

"We are completely out of Tabasco sauce. I figure I have time today, and it's probably ready by now. I wanted to finish it up. Could you go up and get it for me?"

"But it's still raining."

"I know, but the golf cart has a roof. And it won't take you that long, will it?" she asked innocently.

"Aww crap. I guess I'm running up to the old house, huh?"

"You don't have to, dear . . . I could do it by myself." She smiled. "If you don't feel up to it.

"He rolled his eyes "Yeah, like I'm going to fall for that one."

* * *

"How do I get myself into these situations?" Ikey said to himself as he drove up the hill through the pelting rain. True, the cart had a fabric roof. But when the rain was coming in almost horizontally, that didn't help much. The ancient golf cart worked its way up the muddy track that led to the small modular home at the top of the hill. It had been Ikey and Daphne's house, a gift from his family shortly after their wedding. It had a barn and a small corral for their livestock, now moved down the hill to his grandparents' farm. Weeds grew in the front yard, and the whole place had an abandoned air to it. One day soon they would have to come up here and clean all of their stuff out. There was no point in keeping it vacant. With as tight as housing was in Grantville, there were bound to be people willing to live there despite its relatively remote location. But that would be a project for a later day. Preferably one that was a bit drier. In the meantime, he had a job to do. He pushed the button on the garage door opener and pulled in out of the rain.

Finding the barrel he was looking for only took a few minutes. Getting it out of the stack was another matter entirely. It was buried under several years worth of brewing projects. Forty-five minutes later he had the barrel of peppers free and several dozen other barrels and demijohns sorted into several groups. The "Finished" stack was the largest, followed by the "Still Aging" stack, the "I-don't-know-what-it-is" stack, and finally the "Oh-my-god-I-think-it's-evolving" stack. He would definitely have to wander back up here soon to finish sorting it all out. And possibly come armed, judging by the looks of some of the murkier mystery containers. He loaded up the peppers and two other barrels, and locked up. No point in leaving that much alcohol lying around unattended. Or possibly unleashing some fermented creature loose on the unsuspecting countryside. There was a lull in the rain, so the trip back down the hill was both uneventful and drier. But only slightly.

* * *

Daphne smiled at her drenched, muddy husband. "I was beginning to think we needed to send out a rescue party." "No, no, dear, I'm fine. I was just going through what's still up there. You'd be amazed. I brought down a few other things I thought we might enjoy," he said, while standing in the entryway dripping.

"Like what?"

"Oh, I don't know . . . I found that pear mead we made a few years back. And some mulling spices. I figured some hot spiced mead might help you warm up after you finished drying off."

Daphne looked at her husband quizzically "Drying off? You're the only one who's soaked."

"Not for long!" He lunged at her. She squealed and tried to jump out of his reach, to no avail. He caught her up in a bear hug. Shaking his head like a dog drying off, he sent water and mud flying everywhere. In a matter of moments, she was nearly as wet as he was.

"Brat!" She swatted him as she broke free. "Look at this." She spread her arms to display her now dampened clothing. "I just washed all of this, and you got mud everywhere. What am I supposed to do now?"

"I don't know." He grinned "Take a hot shower?"

"Oh . . ." She paused for a moment. There was nobody else in the house for a change. "Race you!" And with that, she ran down the hall, stripping as she went. Ikey followed on her heels, shedding clothes almost as fast as she was.

* * *

Several hours later, they lay in front of the fireplace in their bedroom, sipping hot mead from mugs. Outside the wind howled and drove the rain against the windows.

"I have enough distilled vinegar to make a gallon or two. After that I'll have to hit one of the stores in town. Last time I was there I think I saw some stuff that should be pretty close. I'm not sure how concentrated it will be though."

"Well, honey," He rolled on his side to face her. "I guess we'll just have to play it by ear. We just have to get it in large batches and mix it to taste. I don't think people will care if it ain't exact. Close enough will work. And we will have to start aging more peppers if you plan on making more than a few gallons."

"That's a good thing. I have tons of them growing. I was expecting to sell a lot more of them, but I just couldn't get that many people here to eat them. We could probably get several bushels of them by the end of summer, and still have enough for seeds for next year. I could also make a batch with the habaneros and ornamental peppers."

"What? Why? I thought that chemical weapons had been banned from production."

Daphne calmly transferred her mug from one hand to the other and then proceeded to slap the back of his head. "Wuss. I'm sure we can find people who'd want it."

"Aside from the Inquisition, you mean?"

She didn't even bother to dignify that comment. "You know how it is. I like venison and pork as much as anybody, but the spices here leave a lot to be desired. And when some of these people get their hands on them, well, you remember the dinner party at the Metzgers' place?"

Ikey shuddered. How could he forget? One of their first business dinners outside of Grantville had been at the house of an affluent brewer in Badenburg. Just about everything served that night had been liberally doused in ground black pepper or nutmeg. Even the wine had pepper in it. They found out later that it was a way of displaying how wealthy the Metzgers were. Black pepper was expensive. So was nutmeg. Both of them had to be imported from Asia. Having lots of both to put in everything meant that you had cash to burn. It also meant one of the worst meals either of the Pridmores had ever been to.

"Okay, granted. We'll see if anybody wants it. I'll see if I can dig up some little bottles and labels. I think there are some glass blowers who set up around here recently. They might be interested in a small contract." He sipped some mead from his mug. "And one of the brewers will probably have the corks. Maybe I'll go ask Herr Metzger.

"Don't you want to wait and see how it tastes?"

"Nah, I gave up trying to second guess you and Evie about business stuff years ago. I got sick of eating my words again and again. Besides, I smelled the mash when I was opening it up to check on it. It was good enough to make me drool."

"How could you tell? You drool all over yourself all of the time . . . ." Daphne quickly rolled out of the way of a playful swat aimed at some of her more well-padded regions. The first one missed. The second one didn't. Things went down hill from there, resulting in several more hours of playful recreation.

* * *

A month and a half later the first batch was finished. The Germans sat around the breakfast table and watched in fascinated horror as Ikey and Daphne splashed the fiery red concoction all over their scrambled eggs.

"Ohhh . . ." Ikey moaned. "God, I missed that."

"Mmmm." Daphne rolled her eyes. "Even if we don't sell a single bottle, it was worth it."

"I don't think I want to sell any of this stuff. I don't want to run out again. And this took years to age."

"We have gallons of it, Honey. We won't run out anytime soon. We also don't have to age it that long. The only reason we did this time was because we forgot about it. We can start picking more peppers today. It's not fair to keep this all to ourselves. Let's rack some of it into the bottles and put it on the shelves down at the market."

"All right. But only because I already have the bottles and labels. If we run out though, you are getting a major I-told-you-so."

* * *

The local market agreed to carry the sauce. Since the Pridmores already had a contract for supplying honey and mead, it was no trouble to add another item to their display area. The debate as to whether or not it would sell was put to rest by the end of the first day. All fifty bottles were gone in just over an hour. People were calling the farm to find out when more would be ready. The next morning Ikey brought the rest of the bottles in and he barely made it through the front door of the store. The biggest buyer was one of the managers from the Thuringen Gardens. He bought forty bottles. And had he not brought two of his larger bouncers with him, it would have been unlikely that he could have gotten out of the store with all of them. Another big buyer was a woman in TacRail coveralls who was accompanied by a trio of men who made the bouncers look like friendly puppies. She said it was a surprise for a friend of theirs. They bought almost twenty bottles, and left the store with significantly fewer dirty looks than the Gardens' manager.

When Ikey went to settle accounts with Jim Garrett, the grocery store manager, he was surprised. His percentage worked out to nearly twice what he had expected. When he asked about it, Jim merely shrugged his shoulders and said "I upped the price after yesterday. You said it would take you a few months to make another batch. After the comments I heard at the Gardens last night, I knew people would be willing to pay more for it." He grinned at Ikey. "It also didn't hurt when I mentioned that it would be awhile before you could make more to my wife. Rather loudly. In the restaurant."

"You doubled the price?!" Ikey blurted, aghast.

"Nah. But I did give you a bit more of a cut than we normally do. All of those extra people in the store waiting for you to get here bought a ton more stuff today. It was the biggest Wednesday sales we've had in a long time. Just keep me in mind the next time a batch is ready. If you can give me a few days of lead time, we'll have them lined up around the store by opening time in the morning."

"It's that hot of an item?"

"How many things do we have that remind us of home like that? Sure it's good stuff. But in case you didn't notice, nearly all of the people that bought it today were like you and me. Up-timers. Or they were getting it for up-timer friends. It reminds us of what we left behind. Where we came from. Something that nobody else on this continent would even think of making. It is something that is uniquely ours. By the time your next batch is ready, you'll have plenty of German customers, I'm sure. Especially now that they have it at the Gardens. But for now, it's for us."

"I knew Daphne and I missed it. I just didn't think of it that way. I figured we might get a few of the diehard fire eaters and chili fanatics. And maybe a few others." Ikey paused. "I guess it's just a taste of home."

Federico and Ginger

by Iver P. Cooper

Federico Ballarino stopped his mule and studied the guards at the roadblock. They were too well uniformed to be brigands, but it wasn't unheard of for a local lord to decide to boost his income by imposing a toll. Or even robbing travelers outright. Indeed, it was out of concern of being robbed that he was dressed rather below his rank.

Uh, oh. He was definitely being watched. One of the guardsman waved him to come forward. He reconciled himself to the inevitable and urged his mount into a trot. Hopefully this wouldn't be too expensive. He prudently had his main purse well concealed.

"An' who might ye be, an' wha' be the reason for ye takin' the road to Grantville this fine day," said one of the soldiers.

It was an accent that Federico had heard before, but he had not expected to hear it in Thuringia.

"You're a Scot!"

"Indeed I am, o' one o' his Swedish Majesty's Scots Regiments, on detail t' the SoTF. But what is more t' the point is, who are ye?"

"I am Federico Ballarino."

"From?"

"I was born in Venice. But I have traveled widely in England, France and Germany."

"A papist, no doubt," the Scotsman grumbled. "And wha' is your business?"

"I am here at the invitation of Axel Oxenstierna, his Majesty's chancellor."

The Scotsman looked Federico over, and was not impressed. "And I am the Queen of Sheba."

Federico frowned. "I realize that I am not dressed like a gentleman. The Germanies are not, as well you know, a good place for a traveler to look wealthy. But I have credentials. If you will permit me—" He reached slowly into his jacket, and pulled out an envelope.

The trooper took it reluctantly, opened it, and shook his head. "I don't read Latin. What does it say?"

"I have been invited to be the dancing instructor for the Princess Kristina. I was advised that she is presently residing in Grantville."

"Hmmph. It looks like the chancellor's seal, but . . . no one has told us to expect ye. . . ." He called over another guard.

"Wha' think ye o' this?" He handed over the document.

"I dinna' know," said his companion. "Seems t' me that the princess is a wee bit too young to have a dancin' teacher."

Federico drew himself up stiffly. "I am sure you are very familiar with the customs of the Swedish court," he said drily, "but I beg to differ. She is quite old enough, from what I hear, to start lessons."

The two guards looked at each other. "I know," chortled one, "we'll let him prove himself!" They called over their fellows. "Hey, now, we are about to have ourselves a royal performance."

They turned to Federico. "What will ye do, to show us thy mettle?"

He stared at them. "Would a Scottish sword dance suit you?" Now that took them by surprise. He could see that they were wondering,*What have we got ourselves into?* Which, Federico thought, was no better than they deserved.

But they realized that they were committed. "Aye, that'll do."

"Then lay down the crossed swords." Federico leaped onto the first quadrant, capered in place, and then moved onto the next. He traversed all four squares without looking down, and without disturbing either blade. Then he jumped away, into a final pose. "Satisfied?" he asked.

They nodded vigorously. "Sorry, sir, we meant no harm. An' who'd have thought a Venetian papist would know one of the great Scottish dances? Would some wine and food help make us even?" Federico was agreeable.*Just as well they don't know that the Scots got that dance from the French* , he mused.

After they finished carousing, the trooper who had given him the most difficulty offered to escort him not only into town, but directly to the princess' lodging.

"That would be very kind of you," said Federico. "But give me a few moments to change into more gentlemanly dress, so I don't give pause to anyone else we meet."

* * *

Federico surveyed Princess Kristina. The princess was not what he expected of a girl who was destined to be, upon the death of Gustav II Adolf, the Queen of the Swedes, Goths and Vandals, Great Princess of Finland, Duchess of Esthonia and Carelia, Lady of Ingria, Empress of the United States of Europe, and Captain General of the State of Thuringia-Franconia. Her hair was untidy, with a piece of ribbon slipped into it, looking like red flotsam on a storm-tossed sea. Her blouse and skirt were simple, and marred with scholarly ink stains. Her shoes had low heels, like those of a man.

Somewhat uneasily, he realized that he was under equally close scrutiny. He decided it best to begin the lesson. "Principessa. I am privileged to have the opportunity to instruct you. May I ask what instruction you have received already?"

"My governess has taught me a few steps. But Lady Ulrike is not an enthusiastic dancer; she just does the minimum required for social acceptability." Lady Ulrike, at that moment, was sitting in the corner, knitting, and pretending to ignore the conversation.

Perhaps feeling that she had been too critical, Kristina added, "But she is a wonderful rider and an excellent riding instructor. I ride a few hours each day, and I owe much to her tutelage."

Federico pondered this intelligence. It was vital that he make a good first impression on the princess. He doubted that he would do so by spending an hour having her practice her reverences, or a stately pavane. And it appeared likely, given her equestrian activity, that she was in robust condition. Her skirt would not restrict her leg movements much, and she probably chose it for that very reason.

"Perhaps we can spend a little time on the*cinque passe* first, Your Highness. It was a great favorite of the young Queen Elizabeth of England. And, for that matter, of the old Queen Elizabeth. It is the basic step of the galliard, or as the Italians say, the*gagliarda* .

"Let us begin in the*posture gauche* , like so. Yes, the left foot in front, but weight evenly divided. We begin with a*pied en l'air droit* ." He had leaped onto his left foot, extending his right leg low and forward. "Now we reverse." She copied him. "We repeat this pair of movements.

"Now the difficult part, the*cadenza* . We will make a little jump, so both feet are in the air, and bring the left foot behind, landing in the opposite pose, with right in front. Like so." He demonstrated what he meant.

"A few points. First, the timing. The music is in six counts, but there are only five steps. They are syncopated; one two three four, and five. Also, note how I complete the cadence. I land on the foot behind an instant before I bring down the one in front. If you land on both feet simultaneously, it looks as if you are a sack of grain that has been dumped on the ground. That is not considered*courtly* .

"So, now it is your turn."

* * *

He returned the next day. It was evident, as soon as he saw her, that she was anxious to tell him something. "Have you seen the American ballet?" she asked.*"Bad, Bad Brillo*? Or*The Nutcracker* ?"

"No, Principessa, I have not. Where do they hold these ballets?"

"Different places. At the high school. Or at one of the castles. But I can show you*Bad, Bad Brillo* . I have it on*video* ." She turned to Lady Ulrike. "Please, may I show Signor Ballarino my video?"

Lady Ulrike sighed. He wondered at her reluctance, but she obviously knew where her duty lay. "Yes, of course. But I will expect you to be prepared to discuss the dancing, not just watch it for pleasure this time. This is a lesson, you know."

The governess took a black object out of a locked cabinet. It was the size of a*sextodecimo* , a book made of sheets folded in half four times, then cut. Lady Ulrike inserted it into the flapped slot of a strange, cubelike metal and glass device, and pressed a button.

Much to Federico's amazement, the words "Bad, Bad Brillo" filled a small area of the device then, "Performed by the Grantville Ballet Company." The letters faded away and were replaced by images that moved in a dance that told the story of the ram Brillo and his four ewes.

Federico quickly put aside his curiosity regarding the technology, and concentrated on the dancing.

When it was over, he said slowly, "Thank you very much for sharing that with me, Principessa."

"You liked it? I knew you would," she bubbled.

"This is the ballet of the twentieth century?" She nodded. "It is both like, and unlike, the ballet of our own day." He took a moment to decide how best to express his reactions.

"The performers were all quite young. So I suppose it must be classified as a*ballet de college* , that is, of the secondary schools. In France, each year, the students of rhetoric learn their parts from their dancing masters and, in August, they perform in the courtyard of their college. Thousands of people may come to watch the show." He smiled. "When I was in Paris, I was an assistant dancing master at the College de Clermont. I gave lessons, and I performed the most difficult role."

"And do they do anything like*Bad, Bad Brillo* ?"

"It is difficult to generalize, but if a ram appeared in a*ballet de college* , he would not truly represent a ram. The ram would be but a metaphor for youth. Or the spirit of spring, perhaps." Kristina digested this.

"Brillo's no metaphor," she insisted. "I've seen him."

"I accept your imperial word on the subject," he said solemnly, and bowed. "But let us continue our analysis of the dance. Did you like the lifts?"

"Oh, yes, they were so graceful."

"Before the coming of the Americans, the only instance I can think of in which a man lifted a woman in a dance was in*la volta* . Have you heard of it?" Kristina shook her head.

"It was the English Queen Elizabeth's favorite dance. She jumped, and rode the man's knee as they turned about." Lady Ulrike frowned, but didn't say anything.

"Then there is the way the dancers walked on tip-toe."

"Frau Bitty Matowski calls it*en pointe* ," Kristina explained.

Federico said hesitantly, "I must confess that it is not entirely clear to me how they can hold so unnatural a position."

"I asked Frau Bitty Matowski about that. She said that the dancers wear special shoes, and that it takes years of conditioning before the feet can stay en pointe, even with their help."

"Another aspect. The turn-out of the feet."

"Yes," said Kristina. "In the galliard, you had only a little."

"I teach what is a compromise between the French and Italian styles. The Italians do not use turn-out, the French favor some. But neither use the extreme form that we saw on the 'video.' I wonder how and when that style developed."

"You must talk to Frau Bitty Matowski. She is in Magdeburg much of the time, but if you go to the high school, they can tell you when she will be in Grantville."

"I will do that, Principessa. But please note, it was not entirely foreign. Here and there were steps that looked somewhat familiar. Steps taken from a court dance here, or a folk dance there. I will show you.

"Now, it is time for you to do some dancing." He taught her a few of those steps, as well as the second most popular step of the galliard, the*campanella*, or little bell. After the lesson, he asked one of the guards for directions to the high school, and started walking.*Frau* Bitty Matowski, he wondered. A *woman* dancing master? How curious.

* * *

Frau Bitty Matowski was indeed at the school, teaching a "Dance for Fitness" class. The class had already started, and Federico started to turn away. She pointed at him, and shouted, "New here? First class is free! Get in line!" He found an empty spot on the floor, and joined in. Some of the participants were clearly having trouble keeping up with the pace. It wasn't a problem for him.

The teacher kept eyeing him. He hoped he wasn't doing something wrong. The class came to an end.

"You have danced before. But you aren't an American."

"No, Frau Matowski, I am not. I am Federico Ballarino."

"Please, call me Bitty. Or Frau Bitty, if you must be formal. You are going to meet quite a few Matowskis if you are a dancer. Your name sounds familiar—wait, you are Princess Kristina's dance teacher."

"Yes . . ." That was all he got to say.

"Boy, do we need to talk. Which nights do you have free? Have you seen any of our ballets? I know Kristina has the videotapes. Can you teach our group any of the down-time dances?"

Federico wondered if he would ever get a word in. In desperation, he raised both hands, palms toward her, in what he hoped was the universal signal for, "Stop! I can't answer any of your questions if you don't give me time to speak!"

Bitty stopped talking and smiled sheepishly. "Did you want to say something?"

"You are very kind to ask, Frau Bitty. Yes, I have seen*Bad, Bad Brillo.* It was quite enjoyable. I do hope you will let me see some more of these video . . . tapes. And perhaps you have some books on the dances of your time, that I might borrow?

"As for teaching your group, I am sure that would be possible. I must of course see first to the needs of the*Furstin von Schweden* . After a week or two, I will have a better idea of how often I will be meeting with her, and then I can consider other commitments."

"That would be wonderful," said Bitty.

"Frau Bitty. As one dancing master to another, perhaps you can help me on another matter. You understand, I am not one of the princess' main tutors. I only teach her a few hours a week. So I am given my maintenance, and a small stipend, but I could use some additional income. I had hoped that once I had made her acquaintance, I might put myself forward to tutor her in another subject. But she seems to be amply supplied with instructors in every other discipline."

"The school might be interested in having you teach an adult-ed group class in down-time dances." Bitty held up her hand. "Wait a moment. You clearly consider yourself competent to teach several subjects. How much schooling have you had? Other than in dance, I mean."

"I am a graduate of the University of Padua, where I took courses in theology, law, mathematics, art and music. And I have also studied in Paris and London."

"And which subjects have you actually taught?"

"I taught arithmetic at a school in Paris. And I was a 'traveling tutor' for northerners touring southern Europe when I was, how shall I put it, in-between appointments as a dancing master. Mostly, I taught foreign languages and music to Englishmen, as well as some Scots, Germans, Danes and Swedes. Indeed, my cousin is doing the same thing right now."

"Wonderful! The high school desperately needs teachers. Speak to Principal Saluzzo. The school will pay you a salary, and as a teacher, you can take classes at the Adult Education Center for free. We even have a ballroom dance class."

"Ballroom dancing?"

"That's one of the genres of dancing we had back home, before the Ring of Fire. There's square dancing, clogging, contra, swing, disco and others. But ballroom dancing is what is probably the most similar to what you consider 'court dancing.'"

"Ah. I would like to see that. Oh, and—"

"Yes?"

"Videotapes. Are there videotapes showing different genres of dance? And is there a place to see

them?"

"There are thousands of videotapes in Grantville, and plenty of them show some kind of dancing. I have a fair number of those myself. Don't worry, I'll give you a briefing on what to see, and where. Just let me finish packing up my gear."

* * *

Federico had assembled a list of videotapes of interest.*Top Hat .The Gay Divorcee .Singin' in the Rain .The Red Shoes .West Side Story .Saturday Night Fever .Dirty Dancing .Strictly Ballroom . Swing Kids .A Day at the Races .Blast from the Past* . Some were available for rental from Everett Beasley's store. Others were in private hands. How fortunate, for example, that Irene Fortney was an Astaire-Rogers fan!

Of course, Federico didn't own a VCR or a TV. But a retired couple, the Johnsons, had discovered a creative way of compensating for the loss of their pension. It exploited their one extravagance: a projection TV. Bring a videotape of interest to them, and they would plop it into their VCR. Watch it yourself, or bring as many friends as would fit into their viewing room. Their projection fee was reasonable; the homemade popcorn was optional.

The variety of dance forms Federico saw was bewildering. But then, he should have expected that—he was seeing, in the course of a few weeks, the results of almost four centuries of dance evolution. Bitty had warned him, but hearing was not the same as seeing.*I will learn these dances, one day. All of them,* he resolved.

* * *

On Bitty's recommendation, Victor Saluzzo, the high school principal, hired Federico as a part-time phys ed teacher. After his first day on the job, he and Bitty sat outside the high school, enjoying a mild spring evening, and waiting for Bitty's husband to come meet her. Federico decided it was a good time to broach a delicate issue.

"I assure you, Frau Bitty, that it is not my intent to learn your twentieth-century ballet and form a competing company," Federico said earnestly. "But neither can a dancing master of my ambition be content to be simply a dancer, even a soloist, with your own troupe. I must find my own path."

"Of course, Federico!" said Bitty. "There's room for all kinds of dancing. The joy we take in movement with music is not a fixed quantity, which one troupe consumes at the expense of another. Indeed, it is the reverse. Giving someone a taste of dancing whets their appetite for more." She sipped her drink. "But I do expect you to teach the group that gavotte!"

"Many of your social dances deserve their chance to captivate other parts of Europe," he acknowledged. "After all, several started 'dance crazes' in your 'old time line.' Perhaps, when I have mastered them, I can restore them to their rightful place in our culture.

"Also, I hope that I will be able to develop a new dance vocabulary which combines, in some new and exciting way, the dances of my time and those of your own." He shrugged.

"But that is for the future. First, I must find more pupils, whether they be up-timers or down-timers, who are interested in learning the dances that I know already."

"Oh, I have some names for you," said Bitty. "But it will cost you. You said you knew a dance for a man and two women, is that right?"

* * *

The end of the school year was approaching, and the North Central cheerleading team had come to the realization that it was in danger of becoming irrelevant. North Central was only high school in Thuringia where there were kids who wanted to play football, and hence the football league was no more. No football; no half-time cheer. Basketball was also languishing, at least as a team sport. Baseball was increasingly popular, but didn't seem a good match for cheerleading—none of the breaks were long enough for a good routine. So the cheerleaders had decided to reinvent themselves as a dance team that could put on concerts.

"But where are we going to learn enough new material to do a show of our own?" asked Millicent Anne Barnes, one of their "fliers."

The team was quiet for a moment, then Lisa Hilton, who had been elected as the new team captain, gave Michelle, of the dancing Matowskis, a Look. "Well?"

"I'm sorry," said Michelle. "Every dancer in our family will be in Magdeburg, all summer." She thought a moment. "Well, Adriane Hall used to be a professional dancer. She was a cheerleader in high school and college, too. We'd have recruited her for the ballet company if she weren't too busy with TacRail at the time. I hear she's on leave. So ask her."

Judith Wendell proposed an alternative. "Princess Kristina has a new dance tutor. Federico Something or Other. Maybe he could teach us something new." Her fellow Barbie Consortium members, Vicki and Millicent Anne, nodded vigorously.

"If it's from the seventeenth century, isn't it old?"

"Ha. Very funny. Not."

"Ha yourself."

"Shush you two," said Lisa. "It's a good idea. Hardly any of the German girls have tried out for the team. Maybe if we gave them something familiar to do, they would be easier to recruit."

"I suppose Federico would be okay. Bitty says he's a good dancer. But what about Miss Hall?" asked Michelle.

"What's the problem?" said Kristin Washaw, the graduating team captain. She had strongly favored the changeover, in part because the school might be persuaded to allow local alumni to continue to dance with the team. "Ask them both! We can get a routine out of each of them."

* * *

In college, Adriane Hall took every dance class the school had to offer. She even danced professionally for several summers before resigning herself to a career in management. After her marriage and divorce, she returned to Grantville. She was now, officially, a USE Reserve lieutenant, but really just a glorified office manager for TacRail.

Bitty's ballet company workload had increased, and Bitty had made up her mind to recruit Adriane to take over the ballroom dance class. Federico's arrival in town would, she thought, play nicely into her plans. Bitty stalked her prey, and struck.

"But I'm just here on leave, I'll be back in Magdeburg, soon enough," Adriane protested.

"Oh, I understand that," said Bitty. "But we need you. And, seriously. We're trying to preserve as much of our culture as we can. You're the only professional dancer to pass through the Ring of Fire. So what are you doing with your life? Typing for your country? Let TacRail train a down-timer to do that."

"But who would be my partner? Aren't all your good male dancers going with you to Magdeburg?"

Bitty pretended to need a moment to think of a solution. "Princess Kristina has an Italian dancing master. Federico Ballarino. So appeal to his sense of civic duty." She was fairly confident that once Federico had a good look at Adriane, he would be quite civic-minded.

Adriane agreed to give the class a try. She had no idea what she was getting herself into.

* * *

Federico was happy to help the lovely Adriane out, provided that she in turn would learn some court dance steps and help him teach them to some of his private pupils. A few of the local down-timers, drawn by his association with Princess Kristina, had hired him to teach their sons and daughters, and some movements were easier to teach if they were first demonstrated by a knowledgeable couple.

Adriane and Federico decided to start by exchanging private lessons. They worked together for about an hour, then took a break.

"Does it bother you?" she asked. "I mean, that a woman is a professional dancer? And a dance teacher?"

"It was, I admit, a surprise, madonna. But you should understand, there have been women who were famous for their dancing, even as Vittoria Colonna was for her poetry, or Cassandra Fedele for her oration. And I must mention the painter Artemisia Gentileschi, who is still alive.

"The most famous female dancer, I would say, was the duchessa of Milan, Beatrice d'Este. She performed for the French king, Charles the Eighth, and he urged her to try one of the French dances. To his astonishment, she mastered it on first acquaintance."

"How long ago was that?"

"According to my own teacher, it was in 1494."

"That was a long time ago."

"Not by Italian standards," he said airily. "In any event, I have been studying the entries on dance in the encyclopedias, as well as the library of Frau Bitty. In what you Americans have termed the 'old time line,' in a mere half-century, the French would put 'ballerinas' on stage.

"As a Venetian, I am eager to cause the French to, as you Americans say, 'eat our dust.'" He paused.

"But, signora, I must warn you of the peril you are in."

"Peril?"

"You are in danger of becoming a 'time-ist,' signora," he said with a smile.

"A 'time-ist?'"

"It is a new word I have coined. I was previously informed by one of your compatriots of the meaning of the term 'sexist.'" Adriane winced slightly. "No, it wasn't being applied to me specifically, but to Europeans of my time, in general.

"And, I suppose, with their knowledge of many women of intelligence and achievement, I understand why 'up-timers' think that the men of my age are 'sexists.'

"But you Americans do, in turn, evidence an unfortunate tendency to treat anything that we 'down-timers' do differently as quaint at best. More likely primitive, even bestial.

"Hence . . . 'time-ists.'"

* * *

"What, exactly, is "Homecoming Week?" Federico asked. He had been ambushed by a gang of cheerleaders after one of the ballroom dance classes. Their explanations came fast and furious.

"It's the first big event of the school year."

"We start with a homecoming parade on Monday."

"And we have special dress-up days on Tuesday and Wednesday."

"Like Hawaiian, or Nerd."

"But we always wear class colors on Thursday. Seniors are blue, juniors are green, sophomores are red, and freshman are white."

"And we also have a 'powder puff' game that day."

Adriane joined Federico in the corridor in time to hear the last "explanation." She took pity on him. "That means, senior girls play football against the junior girls, and the boys are the cheerleaders."

The girls didn't give him a chance to ask what "football" or "cheerleaders" might be. "Then, the homecoming game itself is on Friday night. That's varsity football."

"And Saturday is the homecoming dance."

Ah, dance! A familiar word at last. Federico clutched at this straw. "What happens at this dance?"

"Well, first we crown the homecoming king and queen—"

"But in the civics class, I was told that you Americans don't have a king and queen." Federico was still a

little sensitive about this issue.

The girls giggled. "They're just students who are being honored for their contributions."

"It helps to be popular."

"And good looking."

Adriane intervened. "Each of the school organizations can nominate a pair of candidates. All the candidates together form the 'Homecoming Court.' Before the football game, there is a parade, and at half-time, the cheerleaders and the marching band perform, and the homecoming court is presented to the audience. The king and queen are chosen by secret ballot, and the results are announced at the homecoming dance. The homecoming king and queen thank their subjects, and welcome them to the dance.

"Then the king and queen do a slow dance together, just the two of them, and then the rest of the evening is dancing in which all the students can join in."

"This is all very interesting," Federico said diplomatically. "But why are you telling this to me?" Federico was anxious to call it a day, but didn't want to risk offending up-timers, even if they were just teenagers.

"Well, we're cheerleaders! Our big chance to shine is when we do our cheer routine at half-time of the homecoming game."

"Cheer?"

"It's a kind of dancing," Adriane explained. "As the dancers move, they shout out encouragements to their athletes, and insult their opponents. They also do formations and gymnastics to impress the audience."

"The problem is, the school isn't going to have a football team anymore! Not enough down-timers tried out for the team. And the whole excuse for homecoming week was the game. No game, no cheerleading, no dance."

"We were hoping you could come up with something to replace the football game as a reason to do all the other stuff." The cheerleaders waited expectantly for Federico's response.

"It's curious," said Federico. "What you are describing reminds me a little bit of a court masque. It is a form of entertainment which has been very popular in England since, oh, the time of King Henry the Eighth. Each masque has a 'fable'—what I guess you would call a plot—but to be honest, it is mostly just an excuse to dance."

"Sounds good so far."

"The court masque has three basic elements: the masque proper, the anti-masque, and the revels. The masque proper is stately and patterned; it is danced by the nobility. Even royalty will participate. Anne of Denmark, James' queen, was the lead in the 'Masque of Blackness.'

"The anti-masque is performed by professionals, and is much wilder. For example, in 'Oberon,' the anti-masquers imitated satyrs.

"The revels are social dances, initiated by the masquers but joined in by everyone. They dance pavanes, galliards, corantos, branles, contredans, and so forth."

"So the homecoming court are the high school equivalent of the noble masquers of a court masque."

"Exactly. And the cheerleaders are the anti-masquers."

"And the homecoming dance is the revel!"

"Indeed."

The gals huddled. "So, Mr. Ballarino, can you choreograph a court masque for our school?"

Federico hesitated. His first responsibility was to Kristina. But Kristina had friends in the school; she would like the idea of dancing with them. And she could be given a principal role, suitable to her station. Surely Gustavus Adolphus would reward Federico for advancing her.

Wait a moment. What if she tripped on stage? Federico had no desire to learn firsthand about conditions in Swedish dungeons. Well. Federico would*very* judiciously evaluate her dance skills. If they weren't up to par, she could lead a walking dance, like a pavane. That should be safe enough.

"I suppose. If you obtain the necessary permissions. I will also need to see what your cheerleading routines look like, so I know what you are capable of."

* * *

After negotiations that rivaled those of the Congress of Vienna in their complexity, the school administration, the drama department, the cheer squad, the princess' guardians, and the town government reached agreement. Instead of a "Homecoming Dance," for just the high school students, there was going to be a "Harvest Moon Masque," open to the entire community. It would be held at the traditional time, the last full week in October. Federico and Adriane would be co-choreographers.

Princess Kristina had been working hard on her galliard repertoire. In consequence, she was to have her own solo. The princess thought that as a "soldier's daughter," she should have a military title in the program. Hence, Federico and Adriane agreed to list her as the "Lieutenant General" of the State of Thuringia-Franconia, since her father was "Captain General," and that title was to be hereditary in the Vasa line. They thought of it as being something of an "inside joke."

* * *

"Federico—there has been a change in plans." Adriane seemed agitated.

"What sort of change?" Federico asked warily.

"Well, the captain general has asked that the Harvest Moon Masque be, uh, 'geared-up,'" said Adriane. "With his financial support, of course."

"I suppose he has in mind a 'court ballet.' Unlike your up-time ballets, it was danced, at least in part, by noble amateurs. It is really just a more elaborate form of the 'masque,' usually with a mythological theme. The theatrical elements are more extensive, and there is no revel."

"Nothing you can't cope with, right? But as for the theme . . . Gustav wants to make a*political statement* . He would like the event to commemorate his coronation as king of Sweden."

"When was that?"

"October 12, 1617. But the king says that he can live with any date in October. And he is agreeable to still holding it in Grantville, since that is what his daughter wants. The real catch is that he wants a choreography which is suitably, uh . . ." She searched for the right word.

"Laudatory?"

"Yup. Oh . . . you know how we were joking around? Lieutenant General Kristina?"

"Yes?"

"It's no longer a joke. The king likes the idea. Assuming that the prime minister agrees, her appointment will be announced that weekend. So the princess had better have a principal role in the performance."

"Has any thought been given to where this performance would be held? I doubt the gymnasium could hold everyone one who would want to attend."

"Apparently, Chancellor Oxenstierna has already spoken to the principal and to the mayor. They said to tell you that they thought the event will need to be moved to the football stadium. That will hold three, maybe four thousand people."

"Right. So are there any specific choreographic changes he wants? A martial entree, perhaps?"

"Yes. Muskets or pikes or something of the sort. And he said to emphasize to you that the dancer representing him should bear suitable royal indicia. He regrets that he is too busy to dance himself."

Federico breathed a sigh of relief. Gustav's temper was notorious, and he reportedly did*not* take well to being told what to do.

"I wish we had more time . . . Perhaps the princess' honor guard could help? No, they are cavalrymen, not pikemen."

"I have an idea," said Adriane. "The military number can be performed by the Junior ROTC at the school. I believe they have a drill team. If so, the drill can be converted into a dance fairly easily."

"And how should we recruit them?" asked Federico.

"No problem," said Adriane. "I'll talk to the cheerleaders. They'll do the recruiting better than you or I can."

"Whatever works. Now, as to our greater concerns. We obviously will need to rework the overall program to direct it toward the new theme. I will go through Bitty's 'stories of the great ballets' books, to see if they give me any ideas. We'll talk more tomorrow."

* * *

Federico pored over Bitty Matowski's ballet books until his eyes were tearing. Then he had his

brainstorm.

Federico went looking for Adriane. "The masque has evolved into a court ballet titled 'After Night, the Dawn.' It will begin with a court and ballroom dance suite, like that of an everyday masque."

"We can earn some brownie points by offering some of the local nobility the chance to participate," said Adriane.

"Indeed. Then we segue into several anti-masques. The cheerleaders can do their stunts."

"Could the drama club be of any help?" Adriane asked.

"Yes, if they can do comedy. Then we conclude with a more allegorical courtly masque. That's the part which honors Gustav II Adolf. And his daughter can dance there, too. In fact, you, she and I will have the three main roles in the show."

"Is that last act the one where you are going to use the JROTC drill team?"

"Yes. Unfortunately, I think I must omit one part of a traditional masque, the revel. I think it would be anticlimactic to put it in after the part honoring our sponsor."

"I have an idea. The revels could be informal, after the performance. The high school gym, the Thuringen Gardens, and so on could host social dances, of both up- and down-time genres, in various parts of town. I can organize that."

"Excellent. But now I have to tell you the best part. Gustav wants a*political statement* ? Oh, he is going to love the allegory.*And* its source." He explained.

* * *

The rehearsal had not gone well. The cheerleaders just didn't seem able to get the hang of a new pattern which Adriane had taught them; it was too different from what they were accustomed to. Adriane, consequently, was feeling blue.

Federico sat with her quietly. After a few minutes, he coughed, drawing her attention. "It is hard not to worry about a performance."

"Tell me about it," griped Adriane. "I was in one traveling show, and we normally did our routine to recorded music. But then we had to perform it at a festival, which insisted that we use live music. The festival musicians assured us that they knew the song, and the first time the organizers put us together was at the final dress rehearsal."

"They learned the wrong music."

Adriane grinned. "Oh, it was the right music, but they were accustomed to a different arrangement. By the end of rehearsal, we*thought* we had it all straightened out.

"Then came the big performance. Halfway through, the musicians skipped a repeat. The more experienced dancers in the group realized that they had jumped to a later part of the music, and threw themselves into the appropriate section of the choreography. The less experienced ones were oblivious, and just kept dancing."

"So half the group ended with the music, and the other half were caught unawares?" asked Federico.

"You got it."

Federico smiled. "Oh, I, too, have stories to tell. Now, this one, I wasn't one of the performers, but I was in the audience.

"One number was depicting an Italian village market scene. It was, of course, just an excuse to throw in some peasant dances. However, the dancing master had wanted to increase the sense of realism, so he had peasants driving a donkey and cart across the stage at one point.

"The next group came on. They were noble visitors from France, doing one of the new French court dances, a gavotte. What they didn't know was that, while onstage, the donkey had a call of nature."

Adriane snickered. "No!"

"Yes. So on they came. One-two-three-squish. One-two-three-squish."

"And what happened afterwards?"

"The French were solemnly assured that the peasants would be severely punished. And once the visitors had left, the peasants were brought to the palazzo, briefly reprimanded, and then given a five-year performance contract.

"The contract did provide that the donkey was to be left behind, but they were asked to be sure to bring a cart on stage each year, in honor of the event." Adriane laughed.

"Anyway, about the immediate problem. You can't worry too much about just one rehearsal."

"I suppose. We even had a saying. 'The worse the rehearsal, the better the performance.'"

Adriane smiled. "You know how to cheer up a girl."

"It made me sad to see you upset. So I was merely acting out of self-interest." Federico blushed.

Adriane's eyes widened. She touched her fingers lightly to his shoulder. "Thank you," she said quietly.

He took her fingers in his own hand. "You're welcome." Then he released her.

Adriane sighed. "Well, I'd best be getting home."

"I will walk you there." She accepted. They took their time getting there, and paused on her porch.

"Good night, Adriane."

"Good night, Federico."

The next day, Adriane tendered her resignation to TacRail.

* * *

Federico approached the priest. "Father Kircher. What is the status, in the eyes of the Church, of an up-time woman who was divorced, but just by the twentieth-century civil authorities?"

"Ah, then in the eyes of the Church, she was married to her husband at the time of the Ring of Fire. The ecclesiastical scholars have expressed several views as to the effect of that miracle.

"Some say that the husband left up-time is like a sailor lost at sea, and the woman must wait seven years before having him declared legally dead, after which, as a widow, she may remarry. Others, that she was immediately widowed by the event, as it irrevocably sundered them, just as death would.

"A few contend that since the Ring of Fire caused, or will cause, many events not to happen—such as the death of Gustavus Adolphus at Lutzen in 1632—that the marriage itself never occurred. Indeed, the husband never existed." Kircher paused.

"May I ask whether this is a purely theoretical inquiry?"

"Purely theoretical."

* * *

It was a windy autumn Friday. The big event was just a day away. Adriane looked up at the sky. "It's looking a bit threatening."

Federico didn't seem especially concerned. "Yes, I imagine you Americans will have to turn on your weather control machines, soon, make sure it doesn't rain tomorrow."

"What*are* you talking about, Federico?"

"Your fantastical electrical devices for moving around the clouds, or whatever it is that they do."

"Just where did you get the idea that we could stop it from raining?"

"Is it a military secret, perhaps? I saw all the strange devices on your rooftops."

"The lightning rods and satellite dishes?"

"And then there is that great stone tower your people are so mysterious about. It was only when I saw the movie that I realized its true purpose. Don't worry, I won't reveal it to any outsider."

"What movie?"

"I believe it was called,*The Avengers* ."

Adriane sighed. "That was what we call 'science fiction.' Actually,*bad* 'science fiction.' We can't control the weather."

"So what do up-timers do when there's a storm coming in?"

"We get out our umbrellas and raincoats. We head indoors. Or we pray."

Federico reexamined the clouds, frowned, and headed for St. Mary Magdalene's to do his part.

* * *

It had become apparent, early on, that even the stadium would not hold all of the spectators. Federico and Adriane had decided to put the stage near one end, and fill the other half of the field with "orchestra seating." Except in the "VIP section" up front, that was a fancy name for wood benches. The elevated stadium seating behind the stage was reserved for the musicians. Two tents flanked the stage; they would be used as changing areas-cum-stage wings. The area immediately behind the stage was reserved for props and special effect equipment, some of which was covered with tarps.

The hundred-piece marching band paraded onto the field, and then ascended to their section, joining assorted down-time and up-time adult musicians. The cheerleaders were next, strutting out, swinging their pom-poms, and shouting out, as a cheer routine, a highly abbreviated prologue. In the meantime, the food concessionaire, Grantville Freedom Arches, was doing a brisk business, both on the field and in the stands.

* * *

The first act was supposed to simulate a typical court dance of a royal court. The couples were masked, but several were prominent members of the community. The most notable down-timer was the Imperial Princess Kristina Vasa, who would be eight years old in just a couple of months. She was partnered by the thirteen-year-old Count Ludwig Guenther of Schwarzburg-Ebeleben. In addition, young Emilie von Oldenberg had managed to coax her husband, Count Ludwig Guenther of Schwarzburg-Rudolstadt, into participating. The down-time ranks were filled out by various pupils of Federico, Adriane and Bitty, notably the duchess-ballerina Elisabeth Sofie.

The up-time contingent included Timothy and Lisa Kennedy, who had learned swing dancing when they lived in Baltimore, and Ed and Annabelle Piazza. The Piazzas had been active in community theater before the Ring of Fire, and therefore were experienced in up-time theatrical dancing. Ed had even managed to squeeze in a few lessons in seventeenth-century dances, sandwiched in-between his many tasks as President of the State of Thuringia-Franconia. If he forgot a move, well, Annabelle was there to back-lead him.

The first slow-fast pairing was of a pavane and a galliard. Just your usual seventeenth-century "top forty" stuff. These were followed by a slow waltz, and a medium-tempo jitterbug. Finally, the masquers polka'd off. The masquers who were not needed for other acts changed hurriedly, so that they could claim their reserved seats in the VIP section and watch the rest of the show from there.

The torches were quenched, the stage crew rushed in, and half the stage was transformed from the main hall of a court to the common room of a tavern. The other half depicted the street outside. A series of loosely connected comic routines followed, some acted out by members of the high school drama club, and others by down-timers.

In one routine, a husband and wife were standing out on the street. The husband, a printer, explained that he had a "rush" job at the printing house. Off he went . . . to the tavern. There he and his buddies were, drinking beer and flirting with the barmaids, when in came his wife, broom in hand. She chased him around the tavern, much to the enjoyment of the others, and finally cornered him. She swung the broom low; he jumped over it. She swung it high, he ducked. They repeated these movements; suddenly, it was a dance. They stopped to catch their breath. He grabbed a mug of beer and handed it to her; she took a swig. They both grasped the broom and danced around it, first one way, then the other. His buddies each

invited a barmaid to dance, and they all did a peasant couple dance, and then another folk dance, which progressed off stage.

Another number was clearly intended to poke fun at the up-timers' love of gadgets. Some men were sitting at a table in the tavern. A newcomer, dressed in twentieth-century clothes, entered. The locals invited the up-timer to join them at the table. After a few beers, one suggested that they all go fishing. The up-timer said, "I'll be right there; I have to pick up a few things from home," and went out by the "back door." The down-timers each grabbed a simple fishing rod and went out into the "street." They opened a trap door in the wood stage. Under it, a pit had been dug, and they began "fishing."

Then the up-timer returned. He was wearing a fishing vest with many pockets, a helmet with all sorts of strange metal antennae and coils, and carrying what looked like a giant harpoon.

"Wait, wait," he cried. "I will find the fish for you!" He set down the harpoon, put one hand on his helmet and extended the other, and started wandering around the "street," going everywhere, it seemed, but the actual fishing hole. Finally he stopped in front of it, saying in a stage whisper, "What a curious signal I am getting!" He picked up his harpoon and thrust it into the hole.

There was a great (amplified) shriek, which took the audience quite by surprise. The fishermen all fell back, and then the up-timer went to the edge of the hole and reached in. Out he pulled a beautiful woman, dressed as a mermaid. She smiled demurely at the audience.

"Now I understand," he said, "she is only half-fish, so I got only half a signal." He shook his head. "I had best throw her back in!"

"No, no!" shouted his comrades. They lifted the mermaid up, and carried her off stage. The up-timer followed, banging on his helmet perplexedly.

And so it went. The last skit ended with a dark-out, and the stage crew cleared the stage for the second act.

* * *

Amber Higham, the school's theater manager, had arranged for the Grantville Street and Roads Department to loan Federico one of the truck-mounted cherry pickers that were usually used to trim trees. It had an extendible boom, with a platform at one end.

The boom slowly hauled up a giant, reflective aluminum foil-covered disk hooked to the bottom of the platform. As the platform ascended, the stage crew trained spotlights on it. The moon had risen!

The cheerleaders now came back on stage. There were no cheers or pom-poms this time; this was a dance routine, with plenty of stunts.

They were dressed in half-white, half-black blouses and skirts, and wore headbands with a crescent moon symbol. There were now a dozen of them; they had been able to recruit and train two down-timer students.

At one point, they clustered together, with all of them oriented so that only the black parts of their costumes were visible. It created the appearance of a black disk. Then they turned. Not all at once, but progressively, so the black disk first acquired a white edge on one side, then was half-and-half, and so forth, until, finally, it was all white.

Bitty Matowski nodded approvingly. She had deliberately*not* sat in the VIP section on ground level, although she had received an invitation. Instead, she was up high in the stands, but at a forty-five degree angle to the centerline of the stage. That made it easy to see the dancers' floor patterns as well as their "front."

"See," she said to her husband. "They have shown the phases of the waxing moon, from new to crescent to half to gibbous to full." She pondered for a moment. "They really need more than twelve dancers for the best effect, however." As she spoke, the cheerleaders completed the figure, by depicting the waning of the moon. The dance continued.

The centerpiece of the finale was a very difficult lift. The side bases both held the flier's right foot, the front spot grasped her wrist and shin, and the back spot had one hand under her tush and the other on her calf. Millicent nodded slightly, confirming that she was ready to go airborne. On the count, her assistants all lifted, while she pushed down. Millicent was now balanced on just her right foot, which was above her supporters' heads.

To climax the stunt, Millicent raised her left leg to the vertical, holding her left foot in her right hand. Her right arm formed a gentle arc, curving left over her head, and her left arm was straight out horizontally, also to the left. This was the "bow-and-arrow" pose: the bow was formed by her right side, from hand to hip; the bowstring was her raised left leg; the arrow, her left arm. The crowd oohed and aahed.

In the VIP section, Lisa Dailey, the assistant principal, turned to Victor Saluzzo. "Very clever. The Greeks had three moon goddesses: Artemis, Selene, and Hecate. Artemis was also the goddess of the hunt. The bow was part of her iconography." Lisa had been an English teacher before the Ring of Fire.

"Whatever you say," replied Victor. "What I was thinking is that I wouldn't want to try getting into that position even if I was lying on the ground, let alone being held six feet up in the air. And mind you, I got my bachelor's in P.E."

The fliers dismounted, and the cheerleaders edged into a crescent formation, and kneeled.

* * *

Adriane now came onto the field. She was standing atop a salvaged Homecoming '99 float, wearing a silver sequined party dress, and matching shoes. On her head, she had a kind of skullcap to which an ingenious drama club draper had fastened a papier-mâché crescent, painted silver. This cap allowed her long hair to escape down her back; both her tresses and her exposed skin had been liberally sprinkled with twentieth-century "moon glitter" to give her a more celestial appearance.

The float was drawn by a team of white horses. Adriane's coachman, dressed in stage crew black, snapped his whip, and guided the float into a slow circuit of the football field. During this processional, the band played, "Shine On, Shine On Harvest Moon."

Adriane's unusual makeup attracted considerable attention.

"Do you have any idea how that woman has achieved that stunning starlight effect?" asked one of the duchesses in attendance.

"No, but I fully intend to find out," her companion replied.

While they spoke, the float pulled up alongside the rear of the stage.

Then Federico, dressed as a shepherd, made his entrance. The cheerleaders dropped to all fours, and "baa-ed." They were now his sheep. That established, they rose, and continued dancing, surging first in one direction, then another, as the band played a jig tune. As they did so, Federico cavorted about them, seeming to head off their movements and drive them in the other direction. One moment, he was doing a side step, with the stick held to one side. The next, he was leaping, one leg across the other, as he plied his stick in a figure-eight pattern.

The orchestra suddenly started playing an Argentine Tango tune, and Federico froze. Adriane descended from her float, assisted by two of the cheerleaders. She spiraled toward him, caressing the floor with each step, some slow, others quick.

Now she was circling him, and, simultaneously, he turned, hopping on his left foot, while his right foot traced little arcs in her direction. Suddenly, he trapped one of her feet between his. She responded by drawing the toe of her free foot, slowly, sensuously up his leg. He released her foot from the*mordida* , the "little bite," and their dance continued.

A canopy bed, mounted on rollers, was wheeled out of one of the prop tents. Four cheerleaders, two at each end, danced with it, turning it slowly clockwise, and occasionally releasing it to do spins of their own.

In the stands, Victor Saluzzo turned to his wife, Viola. "I know that Adriane is portraying the Moon Goddess Selene, but what was the name of her shepherd?

"Oh, let me think—Federico told me. Endymion, the shepherd, that's it. Selene the Moon saw him asleep in a cave, and shone down to join him each night. Eventually she asked Zeus to give him perpetual youth. Zeus agreed, but insisted that Endymion remain asleep forever."

"Doesn't sound like much of a deal."

"Yes, well, Zeus was one of Selene's ex-lovers. That may have had something to do with it. However, Selene and Endymion still managed to have fifty daughters."

* * *

In the meantime, Federico and Adriane had danced, now in the close embrace, to the edge of the bed. Some members of the audience looked shocked. Others leaned forward. Some did both.

Tim Kennedy thumbed the remote controls of the two precious fog machines. The high school PTA had used them in the "Haunted House" fundraiser it held each year, before the Ring of Fire. Basically, each machine had a piston pump, which forced the fog fluid through an aluminum block heat exchanger. A heating element had already preheated the metal, so the pumped fluid was "flashed" before it was forced out of the nozzle.

Federico and Adriane had been a bit worried about this particular special effect. They only had a limited amount of "fog fluid," so they couldn't practice with it as much as they would have liked to. But they did have a backup plan if the fog refused to materialize.

Fortunately, the machines spewed out a satisfyingly large quantity of fog, obscuring the audience's view of Adriane, Federico and the bed. The stage crew was happy; the opinion in the stands was, perhaps,

more ambivalent. But the spectators did appreciate the conceit of clouds covering up the moon.

The four cheerleaders returned to the bed corners and released the curtain retainers. That was the backup plan, and also meant that they could economize a bit on fog fluid. Federico and Adriane were now completely hidden from view, and the bed, with them aboard, was returned to its tent.

* * *

It was now necessary to pay homage to the third moon goddess: Hecate. The school drama club returned to the stage, its players wearing dog masks, and carrying torches. They pranced about the stage.

Hecate entered, in an improvised chariot. Ideally, it would have been drawn by dragons, but two horses, each wearing a chamfron and neck guard painted to look like a dragon's head, had to do.

"Who is that?" Victor Saluzzo asked.

"I dropped my program, hold on. Okay, that's Hecate, Goddess of the Moon, of Magic, of the Underworld, of Sailors, and of Shepherds."

Ed Piazza overheard. "Sounds like she has a lot on her plate. I know exactly how she must feel."

Hecate was now dancing with her followers, who had been joined by the cheerleaders.

"It looks like Amber is enjoying herself," said Victor approvingly. Amber Higham, high school drama teacher in two universes, and former star of the Minneapolis community theater circuit, was indeed having a blast.

* * *

Princess Kristina entered, stage left, preceded by her attendants. These were Catherine Matzinger and Lady Ulrike, each holding one end of a long bolt of bright yellow cloth, with which they swept across the stage. The worshippers of Selene and Hecate scattered before them, even as night retreats from the light of day. Princess Kristina followed, but stopped at stage center. She was wearing a dress, tie-dyed in blues, yellows and reds. Wings were attached to her back. In one hand she carried a golden wand with a silver star on top. She, too, had received the "glitter dust" treatment. That, of course, only increased the intensity of interest in certain quarters. It was now an*imperial* cosmetic.

Thomas Jefferson Johnson turned to his wife. "Sybill, isn't that the little princess? My eyesight isn't what it used to be."

"Let me check the program, dear. Yes, indeed. It says 'Eos, the Dawn . . . Lieutenant General Kristina Vasa.'"

The musicians played a galliard tune. Kristina performed several galliard variations, short and long, including one inspired by a Charleston step. The silver disk was lowered, and a golden one slowly raised in its place. Kristina danced off stage.

* * *

The high school JROTC drill team marched onto the stage, and formed a double file. They presented arms. Now Federico emerged from the stage left tent. He was definitely no longer a shepherd. On his

head he wore an elaborate headdress, made of some gold fabric which had been folded over and over, accordion fashion, and secured so it would fan out. His shoes had golden buckles, sunburst-shaped.

"There's Federico!" said TJ.

"Yes, he makes a very handsome Sun God, don't you think?" Sybill replied.

Federico's attire had some more secular aspects, too. Specifically, he was wearing a blue surcoat with a gold cross upon it—the Swedish flag.

Federico capered halfway down the line, turned to face the king, and bowed. The drill team separated into two groups, flanking him, and began executing show moves, such as rifle spins and exchange tosses.

There was quiet murmuring in the VIP section, which had the keenest interest in, and appreciation of, the political ramifications of the production. "So this confirms that Gustav is the 'Golden King,'" Fletcher Wendell, USE Secretary of the Treasury whispered.

Arnold Bellamy, of the USE State Department, laughed. "Oh, you don't realize how devious Federico is. He told His Majesty, who told me." Arnold stopped to admire a particularly spectacular spin-kick. Federico's fellow dancing masters would have recognized it as a "kick the tassles" move, but to the up-timers it looked like karate.

"Have you ever wondered why Louis the Fourteenth was called the Sun King?" Fletcher shook his head, and Arnold continued.

"Louis XIV was born, in our time line, in 1638, and ascended to the throne after Cardinal Richelieu's death. The young king loved to dance, even more than his father Louis XIII, and Mazarin was delighted to take advantage of it for political purposes.

"In 1653, the French court, and the attendant professional dancers, put on*Ballet Royal de la Nuit* . It showed Paris from sunset to sunrise. Louis XIV, then fourteen years old, appeared in the final act as Apollo, the Sun."

Fletcher chuckled. "So Federico has taken a piece of French propaganda and turned it into 'Gustaviana.' I like it. Especially if Richelieu, when he reads his spies' reports, recognizes exactly where this idea came from.

"Perhaps we should tell him, so he doesn't miss out?"

"Anyway," Arnold concluded, "thanks to Federico and Adriane, in*this* time line, Gustav II Adolf of Sweden is, and will forever be, the Sun King."

RECYCLING

by Philip C. Schillawski and John Rigby

"Hey! Watch it with that broom." Officer Preston Richards hastily pulled his feet back away from the stiff bristles that threatened the shine of his newly polished shoes. He glanced up from the night sheets he was going over, and looked over the unprepossessing figure before him. The small gray-haired woman in dumpy clothes, with her flesh hanging from her thin frame, was a far cry from the well dressed matron he had met the day of the Ring of Fire. Then she had been a hard-bodied exercise maven. Now the only

thing hard about her was her eyes. But he'd kept his eyes on her for too long.

"Don't you look at me like I'm some kind of white trash, Mr. Officer Preston Richards," the woman spat. "If I happen to be down on my luck, it's the damned Ring of Fire that took away Joseph and my boys."

Richards recalled the frantic figure he had tried to help on that day the world had been split apart. She had been in town checking out retirement homes, and had been left with only her car and the clothes she had with her. She was desperately attempting to contact her family. Now he tried for a soothing reply. "I've never thought you were trash, Mrs. Sanderlin. I just keep hoping that you'll stop staying with us on such a regular basis."

He glanced back down at the night sheets. He hadn't made it through to the petty crimes section yet, but if LeeAnn was sweeping floors in the station this morning, he knew he'd find her usual entry: "Public Drunkenness, LeeAnn Sanderlin, Drunk Tank." Sentencing for nonviolent public drunkenness had become so routine by now that most of the regulars and semiregulars didn't even go before the associate judge any more. Not unless they demanded a hearing, and most were smart enough to realize that they wouldn't get a lighter sentence by going that route. Instead they were allowed to sleep it off on the thin foam-rubber mats in the drunk tank. The next morning they were given a good breakfast by Carolyn Atkins, then put to work at odd jobs around the station or downtown until released. LeeAnn, like most of the regulars and semiregulars, didn't even need much supervision on her morning's work.

"Well, if a person needs to take a drink or two sometimes to warm the coldness inside, and doesn't hurt anybody by it, then there's no harm done, Preston Richards." LeeAnn pushed harder with the broom. "I don't mind sweeping your floors or cleaning out your cells to repay your hospitality when you bring me in, so we're square there. I don't need charity from anybody. I pay my debts."

"Are you sure you wouldn't like to talk to someone who might be able to help?" He'd tried hard to get her counseling and other help when she started to come apart. But nothing he'd tried had worked. He knew from experience that there wasn't much hope for LeeAnn unless she worked out the problems that caused her drinking binges. But that just stiffened his resolve to continue to try to help.

"No. I don't need to talk to any more experts. None of them know what they're doing, anyway, and nothing they do helps. I can get by on my own."

Richards shook his head as LeeAnn moved off. The sagging flesh at the back of her arms wobbled as she worked the broom. He went back to the night sheets, only to be interrupted again by a raised voice from the next table.

"Whoa! Karl, you nearly took my eye out with that thing!" Officer Ralph Onofrio was rubbing his forehead. "Can't you ever get that pen back together without launching the spring across the room?"

Karl Maurer, one of the newer down-timers on the force, grinned sheepishly. "Sorry, I was just checking to see how much ink is left. I do not want to run out while we are on shift." LeeAnn reached past him to place the offending spring on the table in front of him.

"Well, be more careful with it. We still have plenty of refill cartridges left, but if you lose that spring, the pen is useless. We don't have any replacement springs." Onofrio shook his head.

Maurer carefully reassembled the pen. "Why can you not simply make another one? It seems so simple a task for your technology."

"I'm not sure why not," Onofrio answered. "I've just been told that coil springs aren't doable."

"Well, it is good then that a pen spring is not critical." Maurer put the pen back in his pocket.

Richards glanced at the revolver Officer Maurer was wearing. He hadn't been intensively trained on semi-autos, then. He decided to interrupt. "Pen springs aren't critical, no. But since it seems we don't have the resources to do anything about making new springs, we'll have to get by without. That means being careful with all the springs we do have." The officer nodded gravely. Richards picked up the night sheets and left the room, passing LeeAnn who was still working her broom by the door.

* * *

Guenther Wendel stopped LeeAnn as she walked toward the women's locker room at the Public Works Department Recycling Center. "HerrOfficer Richards called and said you would be in after noon today. He is concerned about you. I also am growing concerned with your mornings off. You need to be more careful with yourself."

LeeAnn scowled at her supervisor.*Arrogant little German twerp,* she thought. The coldness started to grow inside her again—memories of her comfortable, fulfilled life before the Ring of Fire warred with the bleakness of her current condition. The last thing she needed was to have to deal with one of the Germans she associated with the change. "I haven't used up all my sick days yet. Until I do, you have no cause to complain. I'm still the best sorter you've got."

She pushed past Wendel into the locker room, where he couldn't follow. As she changed into her work clothes, she was still muttering. "They don't pay me enough to put up with this crap. Even the damn Germans leave here as soon as they can. I need to find some angle and get out." Her words ran up against the memories of all those jobs she'd lost when she fell apart in the year after Joe and the boys were taken. She licked her lips, wishing for some liquid warmth as the cold inside her grew some more.

LeeAnn threw herself into sorting. If she thought of it as a big treasure hunt, it sometimes could be interesting enough to take her mind off other things. There was a large pile to work through. Since the Ring of Fire, all metals, plastics, synthetic fabrics, rubber and glass were required to be separated from other trash and set out for recycling. "Strategic Materials" they now were, not just trash anymore. The announcements had been clear:*'You don't have to get rid of anything you want to keep, but if you put them on the curb, Strategic Materials MUST be in the recycle pile.'*

Hmm, this may be promising,LeeAnn thought. She pulled out a ripped and tattered piece of nylon luggage.*Yes!* It was one of those bags capable of being used as a backpack. The zippers were all popped, and the rips made it unsuitable for further use as a backpack. But the contour bars were still there. She felt the two flat bars that ran under the nylon on the side of the bag the shoulder straps were on. She easily bent the bars with her hands. She sliced open the nylon and removed the precious aluminum.

She dropped the aluminum bars into the aluminum bin.*Not much here* , she thought. Now that most people knew they could get good money from various scrap dealers for any aluminum articles they didn't need, they didn't send them off in the recycling for free. She glanced over as Berta Hess dropped some bent tubing taken from a camp chair into the bin. LeeAnn pulled out one of the tubes. It felt too heavy to her.

"Berta!" The German woman turned. "You can't just assume that any silvery metal is aluminum. You have to check." LeeAnn pulled out her magnet and nodded as it went "clack" and clung to one of the

legs. "See, plated steel tubing."

Berta nodded shamefacedly. LeeAnn shook her head.*They need to train these people more,* she thought. *Berta isn't dumb, she just doesn't have the training or experience to recognize the difference.*LeeAnn glanced over to where Herr Wendel was sitting, filling out paperwork.*I do more supervising around here than he does. Instead of training people to do their jobs right, and watching to make sure they do, he just sits around.* She turned as Berta moved past her, carrying the tubing toward the steel scrap bin.*Arrgh . . .*

Shaking her head again, LeeAnn stepped over to Berta and redirected her. "Remember, Berta. Tubing is on the Special List because it's so difficult to reproduce. It goes into the Special List bin." The tubing would be evaluated further on to see if it could be reused in its current form. If not, the plating would be stripped off and the steel itself would probably end up on the scrap heap to be melted into new steel.

LeeAnn collected the remains of the backpack suitcase and dropped the nylon in with the other synthetics. At some point, "when the budget allows," all the collected synthetic cloth would be further evaluated for possible reuse.

A broken brass candlestick was next. It went into the brass bin along with a bunch of spent .22 caliber cases. All of that went for military use, to make the bases of new shotgun shells for the army.

Her next find made her flinty eyes narrow. She nodded to herself in complete satisfaction; it was too heavy for aluminum. "So Herr Wendel wants to give me trouble, does he? I'm the only one here who knows enough to recognize this for what it is. He won't dare push things and try to get me fired." LeeAnn weighed the heavy pot-metal ornaments in her hands as she carried them to the zinc bin. The experts were still pushing hard for zinc from any source, again for military production. Even now, the zinc was still carefully stripped off from any unusable galvanized steel. Later date American pennies had gone out of circulation quickly once the "experts" finally twigged to the fact that they were mostly zinc and worth far more than their one-cent face value. The one who finally figured that out was awarded the Strategic Materials Prize. "I sure could do with the cash that comes with one of those," LeeAnn muttered.

* * *

LeeAnn luxuriated under the hot shower after work. The oil, grease, food and beverage residues on the recycled trash made for a messy job. The showers the department provided as a result were one of the best benefits of working there. LeeAnn used them every day after work, even when she was running short on soap or shampoo. Today was one of those days. Her shampoo bottle was almost empty, and her binge last night meant that the budget couldn't handle a refill until next payday. So she used soap today to cut the grease on her hair, and only a little shampoo after. That meant her hair would be dry and frizzy when it dried, but she was the only one now who cared how she looked, so that was okay.

As she dried herself, she finally identified part of what had been bothering her all through work that afternoon. Something Preston Richards had said had been nagging at her ever since. And she thought she knew who might have some answers for her. She hurried to dress so she could catch him when he left work.

* * *

Ed Barger, the equipment procurement specialist at the Department of Transportation, stopped warily as the bag lady stepped in front of him on his way down the walk from the department offices. "Uh . . . hello . . . ."

"I'm LeeAnn Sanderlin," the bag lady said. "I work over at the recycling center. You're Ed Barger, right? I have some questions for you."

Okay,Ed thought,*I have seen her over at Public Works before. So she's not really a bag lady.* Still, her worn and stained coat, the shapeless knit hat covering her frizzy hair, and the big roller bag she was pulling sure made her look the part. Ed couldn't help reacting to her that way. "I . . . uh . . . I really don't have any time right now."

"This won't take long," the bag lady said, moving in closer. "I just have some questions about springs, and I remember reading what you told the paper when you-all were pushing for people to turn in their cars for tax deductions, about how the springs and things were needed for the railroad and other equipment." Ed had been moving back away from her as she spoke, but she kept moving forward after him, and now he was trapped against the wall. He glanced quickly to both sides, but couldn't see a way to escape.

"Now," the bag lady continued, grinning up at him, "I heard this morning that we couldn't make coil springs anymore, and I want to know why."

Maybe if I humor her, she'll go away,Ed thought.*It's that or call for a cop.* "Uh . . . well. It's not that we couldn't make them if we had the steel to do it with. It's easy to draw the wire and wind the coils. Heck, Europeans were drawing and winding iron wire for centuries before the Ring of Fire dropped us on them; it's how they made chain mail." It looked like the bag lady understood, because she asked an intelligent question.

"But we're starting to make good steel now. I know that Public Works sells some of the steel we get at the recycling center to be remelted. Why don't they make coil springs out of that?"

"Some crucible steel is being produced. But . . . uh . . . that's just high carbon steel at best, and even wire made from that won't work for coil springs. It weakens quickly and the spring becomes useless. You need a special kind of alloy for reliable coil springs. It will be years before we can get the elements for the alloys in large enough quantities to be able to produce much of it. That's why we needed the cars—most all the coil springs from their suspensions can be used as-is for all the equipment and railroad suspension elements where coil springs are critical."

The bag lady thought that over for a bit. "What else are coil springs critical for?"

"Uh . . . let's see. Lots of things, I guess. I think I heard that some medical equipment uses them. I don't know much about that. But, I know that modern gun designs use coil springs a lot. They power the firing pins and return the bolt after ejecting the empty case in semiautomatic pistols and rifles. And they make the tubular magazines in shotguns work. We can't duplicate any of those kinds of guns until we're able to make reliable springs."

"Thanks. I appreciate your time," she said.

Ed sighed with relief as the bag lady ended the interrogation and moved off. He continued on his way home, shaking his head about the difference between her appearance and her apparent intelligence.

* * *

Walking back home under the low overcast, the cold and rainy spring weather made LeeAnn feel every

one of her sixty-seven years. And something was still bothering her—she couldn't quite pin it down—something about this whole spring thing just didn't make sense, and she couldn't get it out of her mind. She trundled her work clothes and towels along behind her in her priceless roller bag. She needed to swap them out for a clean set tomorrow, and get to the Laundromat before the end of the week. She looked up in disgust as she passed the Hoffman house two doors down from hers. The brats were out again.

The four Hoffman children were all in the front yard, and all concentrating on her. They stared at her the whole time she walked by, waving their hands and fingers at her in hex signs, and all the time jabbering on in high-pitched German. LeeAnn sighed in relief as their mother came to the door and shooed them inside, then she stiffened as the other woman sniffed loudly and tossed her chin as she followed her children through the door.

"Damn arrogant foreigners," LeeAnn mumbled as she turned up the driveway toward her rented room in her landlord's garage. "Herr Hoffman thinks he's a big man just because the Army gave him some training and now they're moving him up to a better job. And of course, Frau Hoffman thinks she's better than me just because they can rent a house. Damn Germans taking jobs and houses, and they can't even speak *English* ." The coldness, and the thirst, were growing inside her.

LeeAnn dumped the dirty work clothes and towels from the roller bag into the hamper and replaced them with a clean set. Then she sighed and looked around her small portion of the garage. Before the Ring of Fire, her section had been set up as an office, partially partitioned off from the main part of the garage, with a small bathroom with sink and toilet off one wall. Now it was home, for which her landlord charged exorbitant rent. Still, it had the bathroom. No shower, but she had that at work. And it was heated. Thank God natural gas supply wasn't a problem in Grantville. The heater was on now, and handled the coldness, at least that on the outside.

LeeAnn looked up as someone knocked on the garage door. "Come in," she said, but her landlord had already pushed through the door, holding a cardboard carton in his arms.

"Evenin', LeeAnn," Rafael Ugolini said. He carried the carton into the main section of the garage and placed it on a new stack of similar ones. The label on this one declared its contents to be: "*Catalogs: Reagan Years.*" He turned back to LeeAnn. "I hope you'll be on time with the rent this month."

"I'll be on time with my rent as always," LeeAnn answered. "And you've got no call to suggest anything different."

"Well, yes. But I'm going to need the money regular-like now that the new baby's coming."

"You'll get it."

"Whatever. For right now, though, I need you to be sure you keep all your stuff in your section. I'm cleaning out the back room of the house for the nursery, and I'll need all of the space up here."

LeeAnn looked over the front section of the garage. That section was filled with what—her nose wrinkled in irony at the thought—was trash. Many of the garages in Grantville were that way now. "Why don't you just recycle this stuff? Then you won't have to move it again later."

"Hah. Just 'cause you work for the recycle place that's all you think about. Well, I recycled my car when the gov'ment asked. I only got the little tax deduction for a regular car though. If I'd a bought that SUV back in '99, I could have gotten the big money for it, and the army would have another armored car

sometime down the line."

"There's a lot of stuff here that should be recycled. It's not worth anything." LeeAnn gestured at the broken bed leaning over in the corner by the big door. The side rail of the frame was splintered, and shredded cotton batting was hanging out of big rips in the mattress. She moved over and nudged a twisted mass of wire and plastic clothes hangers with her toe.

"Hey, this is all twentieth-century stuff," Ugolini protested. "It's worth a lot. We can't make any of it anymore."

LeeAnn raised her eyebrows at this. She knew he was wrong about the wire hangers, anyway. She glanced significantly again at the bedraggled bed.

"Well, maybe I could put that thing on the curb. I'll probably need the space before I'm done."

After her landlord left, LeeAnn sat at her card table on a wooden folding chair and ate the bread and cheese she had brought home for dinner. Berta at work was always nagging her about her food. LeeAnn snorted. "Like I need some foreigner telling me about 'nuut-ree-shun.' I made it through two winters here, so I guess I know what I need to get by." She sighed. It sure would be nice to get some more meat once in a while, and more vegetables. But even when the harvests were just in, those were expensive because transportation was so difficult. Now they were dear. LeeAnn shrugged. She looked at the two wizened apples she'd bought for desert, but decided she was full. She licked her lips, wishing she had something to warm her growing inner chill.

She thought some more about what had been bothering her today. She still couldn't pin it down, and it was truly annoying her.

The light was fading when LeeAnn changed into the velour running suit she used for sleeping and moved to the recliner she used for a bed. The landlord supplied electricity, but he didn't supply light bulbs, and LeeAnn couldn't afford them.*Won't let me use candles or a gas jet either* , she thought with disgust. *Afraid I'll burn the place down.* So it was to bed with the twilight and up with the dawn. When the days finally got longer, she could read after dinner.*I really miss being able to read.*

The recliner had seen better days, but it was hers. She held the covering quilt up and flopped herself down. She was rewarded with a metallic "click" and a poke in her left rear. She cursed, levered herself up, and glared at the offending chair. "Now what am I going to use to pad . . ."

"The 'experts' can't possibly have been that*stupid,* could they?" LeeAnn muttered as she manhandled the recliner over onto its side. She peered into its innards. "Hmm, not exactly what I thought, but close enough." She went to get a set of cutters. A few careful snips removed the item she needed. She got the heavy chair back upright, then stood holding her prize and gazing off into the gloom of the garage. "Yes, they really can be that stupid. They really screwed up this one." She licked her lips, but not from thirst for booze, this time.

Her gaze fixed on the torn mattress in the corner. Her eyes narrowed. She strode over and peered in through the torn cover.*Yep. More in there.* She pulled the mattress forward and checked the object behind it.*There too . . . duh, of course.* Her eyes narrowed even more, then she glanced up into the corner by the big door, and started to laugh. She slept peacefully that night in her saggy recliner, her prize clutched in her hand, warm both inside and out for the first time in ages.

* * *

As LeeAnn walked to work the next morning, Frau Hoffman was sweeping her front steps. LeeAnn gave her a radiant smile, then laughed at the look of surprised confusion her smile caused on the German woman's face. LeeAnn bypassed the recycling center and entered the main office of the Public Works Department, pulling her roller bag behind her. She marched up to the well-fed down-timer secretary outside the director's door, and stated, "Tell Garland Franklin that LeeAnn Sanderlin is here to see him. It's vitally important that I see him about Strategic Materials. And tell him that I'm applying for the Strategic Materials prize."

The secretary looked up at LeeAnn with mild disdain. "I'm afraid Herr Franklin is quite busy this morning. You will have to make an appointment."

"I don't think so.*Mister* Franklin always says he has an open-door policy to his employees, especially when they have valuable suggestions. So you march right in there and tell him I'm here. He will definitely thank you once I let him know that his 'experts' have been sitting on their fat butts on a Strategic Material for years now, and didn't even know it."

Garland Franklin was sent, quite frankly, into a state of shock when his secretary ushered LeeAnn into the conference nook in his office and she placed a football-shaped coil spring in his hand. "Ed Barger over at the Department of Transportation told me that coil springs are required for a lot of important things, especially modern gun designs. He said they are a special steel alloy that we can't make here-and-now. I got this from under the seat of my recliner. There were five of these smaller ones and four big ones," LeeAnn stated. Franklin understood the importance of that immediately. "There are probably thousands like them all over town." Franklin just nodded. "And there are thousands of other coil springs, with different size wire, in box-springs and mattresses also." Franklin couldn't do anything but nod some more. "And there are two great big coil springs on most every garage door inside the Ring of Fire. Most folks don't use their garage doors much anymore. If they knew how important they were, and were offered a reasonable price, they probably wouldn't mind selling the springs to the government. I bet you could make an awful lot of gun springs from just one of those big overhead door models.

"But one thing has been troubling me. If coil springs are so important and can't be reproduced, why aren't they on the Special List at the recycling center? I'm sure now that I remember coil springs coming through in recycled items before. I bet there have been many that just got tossed in with the regular steel scrap and a lot have probably been melted down by now. If I didn't know they were special until I overheard something that made me drag it out of Ed Barger, it's a sure bet that none of the down-timers did."

"Public Works doesn't make up the Special List." Franklin wasn't so much in shock that his bureaucrat's CYA instincts didn't immediately kick in. "That comes down to us from higher up. My department only got stuck with recycling because it didn't seem to fit in anywhere else. And even though the administration gives recycling a lot of lip service, and makes a big deal out of the Strategic Materials prize, they never really put much behind it come budget time."

Now that Garland had recovered himself by getting back on familiar ground, he shook his head and chuckled ruefully. "I still just can't believe that all this spring steel has been there all this time right under our noses."

LeeAnn gave a wicked laugh. "It wasn't under your nose, Garland. It was under your rear end." Garland sank back into the old-fashioned overstuffed chair he favored, now actually noticing the springs creak as he did so, and laughed along with her.

* * *

LeeAnn clutched the Strategic Materials prize certificate in both hands after the award ceremony at the Fourth of July celebration. She'd already tucked the $1,000.00 cash prize into the pocket of her new slacks. Guenther Wendel was one of the first to congratulate her. He was actually beaming with pride for her as he shook her hand.*He's not such a bad guy after all,* LeeAnn thought.The breeze blew a lock of her carefully brushed hair into her eyes. She smoothed it back into place.

Preston Richards also came up to congratulate her. "You've done a very important thing for all of us, LeeAnn. It's amazing how we can all miss the obvious for so long. I'm glad to see you looking better now. I haven't seen you partake of our 'hospitality' at the jail for a while now either. That makes me even more happy."

LeeAnn glanced down at the beautiful calligraphy on the certificate once more. She had thought the cash prize would be the big thing to come from her discovery, but she was finding that having other people looking at her with approval was much bigger. She was amazed at how much her outlook had changed in the months since she had found the springs, and how good it felt to smile again. Each smile put more warmth into her fight against the inner cold than the booze ever had. "Thanks, Preston. And thank you for trying to help even when I was throwing myself away. I guess this means that you can find something to recycle in every sort of trash."

Old Folks' Music

by Gorg Huff and Paula Goodlett

July 1, 1633

"You reckon we could afford to do something special for the Fourth?" Ella Mae Jones was sipping iced chamomile tea and making faces at it at the same time. "Lord above, I wish a person could afford sugar," she muttered.

Nancy Simmons ignored the comment. Ella Mae was always griping about something. "What do you mean, do something special?"

"Well, you know Huey was born on July seventh." Ella Mae made another face at the tea. "And your boys, well, they all have summer birthdays. I was thinking we might have a barbeque. Smoke some ribs. And the corn is coming in. Corn on the cob. We could spare a few ears for a holiday, couldn't we?" Casting a look at Mildred and Regina, Ella Mae smirked a bit. "Well, for those of us who can eat corn on the cob, I mean."

Regina gritted her false teeth for a moment. "Tastes just as good when you cut it off, Ella Mae. And it's a damn sight easier to eat, too. But I figure we can probably do it. The party, I mean. Sort of combine all the boys into one big shebang. I've been saving up from the canning and I think I have enough green beans to last the winter—I could probably get enough for the extra to buy enough sugar for a cake. A yellow cake, unless one of you is holding out on cocoa."

Ella Mae, Nancy and Mildred shook their heads. "All gone the first winter," Milly mourned. "Bucky drank cocoa like it was going out of style when we couldn't get coffee. I've got a little bit of vanilla left, though. That will do for the frosting, with the cream cheese they're producing now. If we can grind the sugar down to powder, that is."

"We'll find a way." Nancy grinned. "May have to run the blender to bits, but we'll see what we can do. I can't tell you how much I'd like some real frosting, even if we have to use cream cheese instead of Crisco."

* * *

The "boys," not that they could be remotely called boys by anyone but their wives, trudged home from the bus stop, trying not to glare at the boarders.

"Ah, youth," Henry muttered. "Wish to hell I had that kind of energy."

"I wish to hell they could carry a tune in a bucket," Jerry Simmons complained. "At least what we did was music." The boarders and some young friends were experimenting with rap, of all things. In a combination of two different dialects of German and badly accented English. Mixed in was a lot of laughter and not a lot of tune. To be honest, not that much rhythm or rhyme either. The kids weren't all that good.

"Good grief." Bucky looked over at Jerry. "It's been a long time since we played, hasn't it? We all got caught up in all the hoopla . . . I haven't pulled the banjo out of the closet since, well . . ." Bucky's face creased. "Must be six years, now."

"We ought to pull the banjo and the mandolin out for that barbeque the girls are planning." Huey grinned. "Show these boys some real music. You've still got the guitar, don't you, Jer?"

"Might just do that," Bucky said, when Jerry nodded. "Might just do."

* * *

The day of the party was clear and bright. And a great deal of work. A blender can turn granulated sugar into powdered sugar. It can even turn rock sugar into powdered sugar. It's not the best way to go about it, but the girls didn't know that. A blender or food processor is made to cut, not to crush. A mortar and pestle would have probably been less work and certainly used less electricity. Still, they had powdered sugar.

"Out." Ella Mae flapped a dish towel. "Out of the kitchen, all of you." Good grief, she thought. Dealing with all these boarders could be a pain.

"Smells good." Karl, one of the youngest ones, smiled hopefully. "Very good."

"And there will be enough for everyone. Just get out of the kitchen, out from underfoot, please. We'll be eating around five. Until then, out. If you need something to do, you could always weed the garden." Ella Mae laughed as Karl scooted out the door, followed by two more young men, Johan and Peter. "Good boys," she muttered. "Good boys, all of them." She peered out the door to see that all three of them had headed for the shed and taken out hoes. "Work like the devil, even on a holiday."

Ella Mae went back to her cooking, enjoying the sounds of young people laughing at their work. Not that she didn't have plenty of her own work to do. Between them, the four families boarded fifteen of the younger miners. That took a fair bit of cooking. Not to mention all the dishwashing.

* * *

"Drat." Bucky plucked a string. "If this thing was any further out of tune . . ."

Henry grinned. "Shoulda taken better care of it, Buck." His mandolin sounded pretty good, he thought.

Bucky turned the peg a bit tighter, then tried it out. "That's got it."

"What do we remember best?" Jerry plunked at his guitar.

That took some discussing. Titles flew back and forth for a while. Just as they settled, Nancy hollered, "Come and get it."

It was a great meal. The girls had had the boarders set up the picnic tables in a line and used some old sheets for tablecloths. There was much discussion of the merits of sweet and spicy barbeque sauce. Some liked it, some didn't, but the racks of ribs disappeared, along with the pile of corn on the cob. And all the other side dishes.

"Almost like it used to be." Henry rubbed his belly. "All of us, sitting around in the yard. Food that isn't soup."

"And," Ella Mae said, "genuine real birthday cake."

Ella Mae had slipped into the kitchen and back. She stood at Bucky's side, holding her treasured cake plate. "Small slices," she warned. "I only made the one."

More discussion followed, along with the sounds of forks scraping against saucers. Then a certain amount of burping followed the discussion. With a general clean-up afterwards. "Nope." Nancy smiled. "Just this once, since this is your birthday party, you four don't have to help. Just sit on the porch and talk; we'll all take care of it."

Huey settled into his favorite chair. The boys got out the old lawn chairs. "I'm glad we kept these old metal chairs. Lots better than the aluminum framed jobs. That webbing wears out too quick." They grouped the chairs together in the shade and retrieved their instruments. Huey gave his tambourine a shake. He couldn't play anything more complicated, but he had a pretty good voice. Well, at one time, back in the day. It was getting a bit reedy nowadays.

Bucky strummed for a moment, then began a song. The others, once they figured out what he intended, began to chime in. Huey started singing, and the boarders who weren't on clean up duty drifted closer.

By the time Bucky got to "You told me once, dear, you really loved me," the younger boys were chiming in on the chorus.

"Listen to that." Nancy peeked out the kitchen window. "Not too bad, are they?"

"Sounds good." Johan paused in his dish drying. "We go out, soon? Hear more?"

"When we finish up." Ella Mae wrung out a sponge. "Now that they've got started, they aren't going to run out of steam anytime soon. They never did, once they started the pickin' and grinnin'. That's what started all of this. Hee Haw."

Regina waved at the door. "You all go on. All that's left is the counter wiping, anyway. I always thought it was the girls on Hee Haw, myself. Draped over the porch like they were."

Ella Mae grinned. "That Bucky. He loved that show."

Bucky started in on "Big Rock Candy Mountain," and Regina grinned. "I always did like that one." She started humming along.

The girls finished the clean-up and drifted outside. Ella Mae got there just in time to do the whistle part at the end.

Huey was feeling pretty good. He rattled the tambourine a bit. "Girls, your turn. What song?"

Ella Mae smiled. "You know my favorite." The boys nodded.

"Sure do," Bucky agreed. He started grinning. "Take it, girls."

Ella Mae waited for the intro, "Some bright morning, when this life is o're . . ."

Jerry added is deeper voice for "In the morning." The chorus of male voices caught on to "I'll fly away, Oh glory," real quick.

Bucky, Jerry and Henry really got into it.

* * *

"That was fun." Jerry massaged his fingertips later that night. "More fun than we've had in a while. But my fingers are sore."

Nancy grinned. "Lost all your calluses, did you?"

"Yup."

* * *

"Herr Buckner?" The question came from young Johan.

"Hmm?" Bucky looked over at him.

"You and your friends, you will play the music today?"

"Reckon we could," Bucky said. "Didn't realize you boys liked it that much."

"We like it." Johan nodded. "Much better than Mountaintop, at the Gardens. Is . . . more sound we like. I invite friend, next time."

Bucky had to admit that having all the boys around was kind of fun. The boarders all chipped in with the work. And youngsters had so much energy. "I'll go check with the others. Here, you finish this row." Johan took the hoe and began carefully weeding the row of corn.

* * *

"Johan wants to know if we're going to play tonight, since we're off today."

"Which Johan?" Huey asked. "We've got three of them."

Bucky grinned. "The one that stays in my attic. At least I think he's in my attic. For all I know, he's in yours. These kids run in and out of our houses like they've lived here all their lives."

"I like it." Jerry's face was sad. "It's like having the kids and grandkids back. Sort of."

They grew quiet for a bit. Loss and grief was a familiar feeling to them all. "Anyway." Bucky shrugged off the mood, "Johan liked the music. Asked if we'd do it again. Reckon we could just sit around the yard and play for a while, since they like it."

"Why not?" Henry stood up. "Beats cleaning the chicken house, don't it?"

* * *

It became something of a ritual over the rest of the summer. More of the young miners began showing up, invited by the boarders. They sang along, even. Started bringing girls with them. And refreshments, food. Picnicking under the trees.

"How did we wind up with so many people here?" Nancy asked. "Never imagined anything like this."

"There's about thirty extra," Mildred pointed out. "And they brought stuff. Loaves of bread, cheese. Like they're paying admission."

Regina shook her head. "To hear us and the boys? Who'd have thunk it? We were just messing around, that's all. Never serious about it. Playing."

"Well, they like it." Mildred smiled. "And they're learning the songs. Johan says it helps his English."

"Which Johan?" The question came from three women.

"All of them." Mildred laughed. "And that little weedy one is learning banjo from Bucky. Paying him for lessons by doing Bucky's chores, even."

* * *

"It's getting a little chilly for this." Jerry shivered to demonstrate. "Really chilly."

The late October afternoon*was* pretty chilly. "We're probably going to have to give this up till spring," Huey said. "It's getting too cold. Hate to disappoint the kids, but we can't keep this up. I'm not good with cold."

* * *

"What?"

"We want to offer you t' gig." The big Scot waved a hand. "Your boarders have told us about you. So we'll pay you to play at t' Gardens. Drinks and a meal. Pass the hat for tips."

"Don't that beat all?" Bucky looked at his group of friends and grinned. "Don't that just beat all?"

* * *

Going "pro," as it were, meant they had to come up with some kind of program. Which caused a good bit of argument.

Regina clattered around the kitchen, practically slamming the cabinet doors. "But I like it. And I don't see why playing it at the Gardens would be a bad thing."

Gospel hadn't ever been Huey's favorite, so he'd suggested losing most of it and just going with the old bluegrass favorites.

"It's still a bar." Huey took a sip of coffee. "I'm just sayin'—"

Jerry put a stop to it, though. "We'll just do it like they used to do on the television shows. They all pretty much had a bit of gospel, near the end, usually."

After that the program fell in line pretty well.

* * *

Mildred gulped when she saw the audience. "I'm all over nervous. All over."

"Buck up there, hon." Bucky grinned at her. "You'll do just fine."

It was an unusual night at the Gardens. Rather quiet, in fact. Right up until the audience started joining in, that is.

Nancy started this one. She began the rhythmic clapping and sang the first line. The rest of the girls followed her. "Go to sleep little baby . . ."

Bucky was up next. Just about brought the house down with his rendition of "Cold, Cold Heart." Of course, he followed up with "Your Cheatin' Heart," which had all the young ones chiming in.

One set followed another. They'd agreed to do four. Regina had been looking forward to the last set all evening. She took a deep breath. "Oh, sisters, let's go down . . ."

The girls did the sisters and mothers lines, while the boy's did brothers and fathers. The whole house was chiming in on the sinners part. Everyone had the melody down by this time.

It worked much the same way for many other tunes. Of course, the miners helped that along a good bit. They'd memorized a lot of them by now.

"Angel Band" was a big favorite. Everyone in the place joined in for "Bear me away on your snow white wings."

"All right." Bucky looked out over the people in the audience. "One last one, folks. Then us and the girls are giving it up for the night. We've got a meal coming, you know." The audience laughed, those that understood it, anyway. "The Old Folks want you all to join in for this one."

Bucky stood back and began the music. Nancy, Mildred, Regina and Ella Mae began. It was another

favorite of the younger folks. They all joined in for the "Keep on the Sunnysides," in that one.

* * *

"Every couple of months," Huey agreed. "None of us are getting any younger and we're not up to a lot of this. Same deal, I suppose? Drinks, a meal and pass the hat?"

"Agreed." The Scot extended his hand. "We'll be glad to have you back. Now, enjoy the meal, all of you." He motioned the waitress over to take their orders. "On the house," he told her.

"This was fun." Nancy looked around the Gardens after they ordered. "Never dreamed it would be, but it was."

"I've got so many people wanting lessons," Henry pointed out, "that I could quit the mine and just do that."

"Me, too." Jerry grinned. Bucky nodded agreement. "Same here. And it's a lot more fun than the mine, that's for sure."

"Something to think about," Huey agreed. "Not that I'm a player, but they like the singing, too. It'd keep us busy, right enough."

Nancy, Ella Mae, Regina and Mildred shared a smile.

Mightier than the Sword

by Jay Robison

Magdeburg, Early winter, 1634

Frank Jackson looked out across Magdeburg from the window of his office. Under a blanket of snow, the capital of the months-old United States of Europe looked deceptively tranquil. Underneath the blanket, though, Frank knew there was a dynamic city, still growing, still filling out. A city that was ugly and industrial but beginning to get the sorts of cultural institutions that gave any city, in any time, an indefinable sense of "livability." Frank shook his head. Things like that were for Mary Simpson and her gaggle of*grande dames* to worry about. Frank focused back on matters military and the grinning face of his commanding officer. It was one of those rare moments when Lennart Torstensson looked as young as his years.

Frank was sure the reason the Swedish general looked so young was because Torstensson had him right where he wanted him and knew it. Frank was still wondering how his simple idea had gotten so complicated. When he'd promised his head of training, Henderson Coonce, that he'd recruit a press officer, Frank never imagined his new superior would take such a shine to the notion. Frank had asked for an inch and been given a mile.

"All I wanted was one press officer. Just to shut Henderson up. The last thing we need is more REMFs!"

Torstensson smiled. Frank had come to truly admire the man. Frank had a head for tactics, but serving under the Swedish general was a revelation. Lennart Torstensson, Frank knew, was a military genius.

And Frank was most assuredly not. Above all, Frank Jackson recognized his own limitations and wasn't afraid to say "I don't know" if he didn't know something. The former coal miner suspected that this quality alone made him stand out in comparison with most of the German commanders Torstensson had had the misfortune of working with. It contributed to the good relationship Frank enjoyed with the man.

"Dammit, Lennart. An army of Joe Buckley's won't defeat our enemies. I can just see Richelieu wetting his robes at the idea! Besides, I'd've thought you'd hate the idea of a bunch of press flacks," Frank said.

Torstensson laughed. "You up-timers have a habit of thinking that nothing from the world you knew exists in this time. Actually, His Majesty has been employing 'press flacks' for over four years now. I'm surprised you're so resistant to the idea after your experiences in combat and the divisions which arose in your society over that military adventure in Asia."

"Since when have you been studying about Vietnam?"

"Admiral Simpson was kind enough to recommend some books, and I had editions printed up for myself and a team of translators. I think His Majesty, as well as Horn and Banér, will be interested in the history of that conflict. Especially since so many of you up-timers gained combat experience there."

Frank grunted. "Well, if Gustavus had been running that show, it might have turned out differently."

"Perhaps. In any event, I was struck by the comment of your head of state during that war, Lyndon Johnson. Remember what he said after the news presenter, Cronkite, came out publicly against this conflict?"

"I remember," said Frank sourly. "He said, 'If I've lost Cronkite, I've lost America.'"

"Just so. Without support from the people that matter, the best generals in the world will go down in defeat no matter how they fare in the field. It's a very old story," Torstensson said. "And in this brave, new world our emperor and his prime minister are making, the masses are people who matter. Should we not make ourselves look as good as possible to them? Make certain our side of the story is presented in these newspapers that seem to be sprouting like weeds?"

"I still say it's a waste of personnel," Frank grumbled.

Torstensson was ready for him. "I am confident we can find suitable people who wish to serve but are not fit for combat. You yourself have admitted that many of the soldiers in essential noncombat positions wouldn't have been considered physically fit to serve if they'd had to have an exam."

Frank backed off. There was no way he was going to win this argument. His CO had obviously made up his mind. "So is this my headache now?" he asked.

"Not entirely. I have in mind a candidate to command this mad enterprise. But we'll need a balance of personnel who are fluent in German, English and Swedish. I expect you to submit a list of candidates as soon as possible."

Frank knew an order when he heard one. "Of course, sir. If you want this, that's good enough for me."

"You've proven once again, General Jackson, just how much better you are than almost every German 'officer' I've come across. You will, no doubt, come up with some excellent candidates." Torstensson's eyes went to the oil painting hanging behind Frank's desk. Frank could tell what his superior was thinking:

It showed surprisingly sophisticated taste for a man who, until relatively recently, had been a laborer. That boyish, mischievous smile returned to Torstensson's face.

"I like that painting, Frank. I am surprised. I would have thought you'd have preferred a fanciful scene with animals. Perhaps animals playing cards."

Frank eyed his CO beadily. "Permission to speak freely, General?"

"Of course."

"Shaddap. Sir." With a laugh, Torstensson left.

Once alone, Frank started a list. Unfortunately, it was very short. Most of the people he could think of were needed in more essential posts, either civilian or military. Perhaps, Frank thought, it was time to grab a bite at the Freedom Arches.

* * *

When he put out the call for citizen-soldiers, Mike Stearns had expected the Committees of Correspondence to flood the new USE militaries' ranks with volunteers. He hadn't been disappointed. In fact, thought Joachim von Thierbach—not a little smugly—the CoC had exceeded even the prime minister's considerable expectations. Which made conversations like the one Joachim was having now all the more difficult.

Kurt von Kessel was much like Joachim. He was the son of a minor*Reichsritter* from somewhere near Frankfurt am Main. And, like Joachim, Kurt had been a student at the University of Jena who had thrown himself into work with the Committees of Correspondence. Joachim knew for a fact that Kurt was a former client of Inga, a prostitute in Jena and cousin of Joachim's fiancée, Mathilde. Kurt had been encouraged by Inga to embrace the radical notions the Americans espoused.

In the heady days after the Battle of Wismar, Kurt von Kessel, like so many others, volunteered himself to the service of his country. Unfortunately, he was thin, had a weak constitution and a hip that frequently became dislocated because of a childhood injury. The wonder was not that Kurt had flunked the army physical; the wonder was that he even thought he would pass it.

"Four-F, whatever that means," Kurt said to Joachim, nearly in tears. "I can shoot a gun just fine. I don't see what physical fitness has to do with that!"

"It has everything to do with it. On a long march or in a charge, especially. What if your hip dislocated at such a time? You would surely be killed, and you might also cause the death of soldiers trying to protect you. I'm sorry, Kurt, but this is a sound doctrine. You would be a liability."

The look that Kurt gave Joachim was full of anger and bitterness. The man known as Spartacus sighed. As Joachim saw it, he was being cruel to be kind.

And it wasn't as if Kurt couldn't be of service to the USE. It was true that, when writing under his preferred*nom de plume* of "Silence Dogood," Kurt couldn't match Joachim and some of the other CoC writers in passion. But Kurt had a gift for writing clear, concise, easily understandable prose that Joachim envied.

It was then that Joachim von Thierbach realized he'd had what some of his up-time friends referred to as

a "brain fart." There was a way for Kurt von Kessel to serve his country—in uniform.

"What are you smiling about, Spartacus?" asked Kurt angrily. "This is hardly a laughing matter."

"Kurt, my friend, I am smiling because I am a complete*dummkopf* ." Joachim found a scrap of paper, pulled out his fountain pen and scribbled a note. He handed the note to Kurt. "Here. Give this to General Jackson or his adjutant. They won't be putting a gun in your hands, but you'll be in the army."

Joachim barely had time to finish his sentence before his friend had snatched the note and made a beeline out the front door of the Freedom Arches. Kurt didn't seem to care so much that he wasn't going to be on the front lines. He was getting a chance to serve, and that was enough.

* * *

Frank's adjutant, John Sterling, stuck his head into Frank's office. "Private McDougal is here as you requested, sir."

"Send him in, John."

Private James Byron McDougal, better known to most as "Jabe," walked into the office. Frank looked at the young man. Physically, Jabe bore great resemblance to his father, Pete McDougal, a fellow UMWA man with whom Frank had been friends for years. But young McDougal had a serious, thoughtful manner that didn't come from Pete or, as far as Frank could tell, from Jabe's mother, Zula. Maybe Jabe got this from Zula's side of the family. She'd come from Pennsylvania, so Frank really didn't know her people.

Jabe saw the painting hanging above General Jackson's desk and smiled. Frank noticed the look and looked at the painting again himself, nodding approvingly.

"That young lady of yours can paint, Private, and that's a fact. It was bad enough that Mary Simpson was on my case about decorating the office, but she threatened to pick the paintings herself if I didn't do it. And Diane agreed with her!" Frank still couldn't believe this act of spousal treason. Though, in truth, he got along with Admiral Simpson and his wife reasonably well these days. Frank knew next to nothing about art. He'd been content to let Diane decorate their house with works from her native Vietnam, which he rather liked—even if he was loath to admit it. As he was fond of saying, he didn't know much about art, but he knew what he liked.

And he'd liked*Ripper's Repose* when Diane and Mary had shown it to him. Taken from a scene of the movie*Dr. Strangelove* , the painting wasn't dogs playing poker, but it was art Frank could live with. It was a simple study of General Jack D. Ripper sitting at his desk, pensively studying his lit cigar. Prudentia Gentileschi, the painter of the piece, had infused General Ripper with a humanity that he lacked in the film. That Prudentia was the daughter of famed Artemisia Gentileschi—painter to royalty—and was becoming a renowned artist in her own right, bothered him not at all. Frank Jackson was not ashamed of being a hillbilly, and he liked confounding people's expectations. In this case, specifically, Lennart Torstensson's expectations. Plus, Mary Simpson said the work was a fine example of "chiaroscuro," whatever the hell that was.

"I don't know if she's 'my lady' or not, sir," said Jabe, coloring with embarrassment. "I guess we do spend a lot of time together."

"So I hear," said Frank. "But I didn't ask you here to talk about your love life. I have a question to ask

you, and for the moment I want you to forget I'm a general and you're a private. I want your honest answer. What do you think about being in the Signal Corps?"

"It's okay, I guess," said Jabe. He shrugged a noncommittal shrug.

Frank flipped through the pages in Jabe's service jacket. "You must not like it all that well, son. Your commanding officers like you, but they all say the same thing—you aren't performing to your potential."

A mix of emotions showed on Jabe's face: guilt, shame and a little anger. "I'm sorry, sir. I do try. I'll try harder, I guess."

Frank smiled what he hoped was a reassuring smile. "Jabe, if you break a knife because you were using it as a crowbar, is that the knife's fault?"

"No, sir. You shouldn't use it like that. It wasn't made for it."

"Exactly. I think we're not using you the best way we can. I know you can do great things. People who know more than I do told me that making that documentary a few months ago in the time you had was the next thing to impossible. But you went ahead and did it. And did a hell of a job besides."

"Thank you, sir."

"You're welcome. Now I'm a general again. Private McDougal, General Torstensson has decided to set up a small press corps and asked me to think of some candidates for it. I think you'd do well serving the USE in that role. Is there any reason why I might be wrong?"

"No sir."

"Good." Jackson slid the official orders across his desk to Jabe. "You'll be adjutant to Lieutenant Kurt von Kessel, who'll be in charge of the press division office in Grantville. Congratulations, Sergeant McDougal." Frank stuck out his hand.

"Sergeant?" Jabe shook his superior's hand dazedly.

Frank grinned. "Yup. Forgot to tell you—the job comes with a promotion. Report to the map room at the imperial palace tomorrow morning at nine. Dismissed."

Still in a daze, Sergeant Jabe McDougal saluted and left. Frank chuckled. Jabe was a good kid, as he expected from the son of Pete and Zula. He was also transparent as hell. Frank knew his newest sergeant was thinking of his girlfriend.

Grantville, Early winter, 1634

The object of Jabe McDougal's affections was, at that moment, in Grantville staring at a half-empty canvas. Prudentia Gentileschi sighed. She seemed to be lacking inspiration and concentration in equal measure today.

Jabe had been called to Magdeburg on military matters, and Prudentia missed him. It was their custom to meet at the recently opened Sternbock Coffee House in the afternoon, and Jabe treated Prudentia to

dinner at the Thuringen Gardens when his modest Army pay allowed. She felt tense in an odd sort of way, as if she'd been going without something essential—even though they never went beyond holding hands and relatively chaste kissing.

Their relationship had deepened and grown since October of last year when Prudentia had spent the night watching Jabe edit a documentary about the heroes of the Battle of Wismar. Even before that night, before they knew each other well, Prudentia had appreciated Jabe's thoughtful nature. In her experience it was a very rare trait among the male of the species, up-time or down-time.

On the night of October 10, 1633, Prudentia had seen in Jabe the soul of a true artist, working in a medium that was about to disappear from the world for a good many years. She hadn't thought that possible from the son of a laborer.

Her first real meeting with Jabe's parents hadn't gone particularly well. Not long after the Battle of Wismar, Zula decided to move to Magdeburg with her two younger children to be with her husband. Pete had been granted a brief leave in early November to help Zula pack up the house. Mrs. McDougal had only briefly met Prudentia, so she more or less insisted that Jabe bring his new girlfriend to dinner.

The first problem had been with the food. Zula prided herself on being able to set out a good spread when she had the time. But the traditional West Virginia fare, with an emphasis on lots of gravy, was not to Prudentia's taste. Try as she might, Prudentia couldn't quite hide her dislike of it. Zula was not too pleased at this, but had this been Prudentia's only mistake, it would have soon been forgiven and forgotten.

The critical misstep came later in the evening. Pete McDougal was still nursing wounds from John Simpson's initial visit to Magdeburg, shortly after Mike Stearns had prevailed upon Simpson to resume his naval career. Pete, at the time, was representing the New United States' interests in Magdeburg. Simpson had been critical of Pete's operation from the start. That events had validated Simpson's criticisms was bad enough. Jabe had told Prudentia that, for Pete, it seemed there was a cloud over him. In his father's mind, Jabe had said, the fact that he hadn't been appointed to one of the administrator positions in Thuringia was all Simpson's fault.

Despite this warning, Prudentia made the mistake of agreeing with John Simpson and saying so out loud to Pete. After all, hadn't the admiral been proven correct? It seemed to her that Pete was being rather prideful. What Prudentia hadn't counted on was how deeply that wound still ran. Attempts to repair the damage from that*faux pas* were ongoing.

Hard on the heels of the disastrous dinner with the McDougals was the premiere of the Grantville Ballet Company's production of*The Nutcracker* , not long before Jabe had been called to Magdeburg. It was the hottest ticket in town, and the only reason they'd even managed tickets for the cheap seats was because Prudentia had painted the large oil painting that hung in the lobby of the auditorium. It depicted Carl Shockley and Staci Matowski in their featured roles. She'd had a half-finished painting on hand that was suitable and could be modified, and she was grateful enough to have her work seen by area notables who might become potential patrons.

The night had gone quite well. The performance was extremely well received, and as part of her payment for the promotional painting Prudentia had been invited to the reception following the ballet. The reception was attended by the performers and the area VIPs who wanted to meet them. She made several useful contacts.

On the walk to the Nobilis' house, she asked Jabe what he thought about the performance.

"It was okay, I guess. Ballet and that kind of stuff has never been my thing. But it wasn't bad."

"You seemed to spend most of your time eyeing Staci Matowski." Prudentia had meant for that to be teasing; it came out brittle, challenging. Prudentia reflected on her own appearance: long, black, wavy hair; olive complexion; and dark, intense eyes. She didn't consider herself unattractive, but she never had and never would have a ballet dancer's physique. She wasn't terribly pleased to have Jabe ogling the dancers. She wasn't entirely sure why Jabe liked her and so was not completely confident about her attractive qualities.

Jabe couldn't hide his irritation. "I can't help looking, Prudentia. Those women are in great shape. I'll bet your mother would use them for models if she were here. You should think about it yourself."

She didn't answer. Jabe continued, "It's not like you weren't eyeing Carl Shockley's butt, yourself." It was a well-aimed thrust. Prudentia flushed and dropped the matter.

At least her career seemed to be taking off. In spite of the fact that she was not a master painter, Prudentia had received far more offers of work than she could possibly say yes to. She'd painted a study of Jabe at work on his computer, which she'd titled*Sculptor of Reality* , and had given the finished work to Jabe as a gift. It hung in a place of honor at Jabe's house. When his mother and younger brother and sister joined Pete McDougal in Magdeburg, Jabe had insisted that the painting remain in Grantville with him. Boarders now lived with Jabe in the McDougal home. It was through them that word of the painting had gotten out. The commission for the ballet created even more "buzz," as her up-time friends would say.

The offers started coming fast and furious after that. Princess Kristina, or at least people on her behalf, had commissioned a painting in honor of Hans Richter and approved the concept sketch Prudentia had submitted. It was tentatively entitled*Falcon Astride the World* and was still very much a work in progress. Prudentia was working on several*modelli* , what some might call "oil sketches," showing possible designs. It was one of many works commissioned in honor of the fallen hero, if not nearly so grand as the planned statue that was to dominate Hans Richter Square in Magdeburg. Prudentia's painting would show, in some fashion, Hans astride the imperial palace in the manner of the Colossus of Rhodes. The style she was using was influenced by a comic book Prudentia had seen. Unusually for an up-time comic, it was painted rather than inked, and she quite liked the style. Jabe called it "photorealistic."

Her other ongoing project was frontispieces for three of Albrecht von Wallenstein's favorite Agatha Christie novels:*The Murder of Roger Ackroyd, And Then There Were None* and*Murder On the Orient Express* . Wallenstein's nurse, Edith Wild, had complained that the recently crowned king of Bohemia had read her paperback copies of those particular books to tatters. New editions were being printed and would be presented as a gift from the Jews of Prague to their new sovereign to mark the first anniversary of his glorious reign. The money for the commission came from Don Morris Roth. It was said that Don Morris was founding a university in Prague that would admit women as well as men. Prudentia was pleased he'd remembered her now that he was one of Europe's richest and most important people. Life, on the whole, was good.

It would be better, though, if she could hear from Jabe. He had gone to Magdeburg with tensions between the two of them still lingering. But unless Jabe was being posted away from Grantville for an extended period, he probably wouldn't write to her. She would just have to wait. With a sigh, Prudentia turned away from the half-finished*modello* she'd been staring at and opened her chemistry book.

Magdeburg, Early winter, 1634

Major Nils Bloss checked his new uniform one more time. The uniform, with the rank of major it denoted, was new. He'd received it only yesterday, along with his current assignment.

Bloss paused before proceeding through the doors and into the Map Room. He looked around. The imperial palace of the United States of Europe didn't look quite as grand as he expected. Though he'd seen his share of provincial castles and manor homes as an officer in Gustavus Adolphus' army, he hadn't really seen any of Europe's great palaces, so he didn't have much of a basis of comparison. Still, for the palace that the emperor of the USE would have called home if he hadn't been in Luebeck, and where Princess Kristina Vasa currently lived, Bloss expected more. However, one thing Nils Bloss could not deny was that this palace pulsed with energy. It seemed to him like something great was always on the verge of happening here. What the imperial palace lacked in grandeur it more than made up for in sheer action.

"Sir, would you like me to get the door for you?"

Bloss snapped out of his reverie and saw a young sergeant standing at attention. The young man had addressed him in German that was quite good, his accent marking him as an American from the future, "up-time," as people said.

Major Bloss became conscious of the cane that he needed to walk. The young sergeant was in dress uniform rather than work fatigues, so Bloss didn't know his name. He returned the salute and broke the ice.

"That is most kind of you, Sergeant . . ." Bloss trailed off.

"McDougal, sir. James Byron McDougal. If you hear people refer to 'Jabe,' that's me, sir."

The major held out his hand, and the younger man shook it. "I am Capt—, er, Major Nils Bloss. It's a pleasure to meet you."

The young sergeant opened the door for Bloss, smiling as he did so. "Newly promoted, sir? I know the feeling. And, uh, congratulations."

Nils and Sergeant McDougal were the first ones there and so made themselves comfortable, telling each other about themselves. The young up-timer was quite shy at first but was soon put at ease. Nils Bloss was the sort of person who never met a stranger, and he'd never had much use for military punctilio. He was interested to hear that Sergeant McDougal had done the documentary that had aired in honor of Hans Richter, Larry Wild and Eddie Cantrell that he had seen while recovering from his injuries. It had been aired many times since its original screening a few days after the Battle of Wismar. News that Eddie was alive and in Danish custody had only added to its popularity.

"An excellent piece of work, Sergeant McDougal. It is no wonder you are invited to take part in this 'press division.'" Major Bloss said the last two words in English.

Feeling an affinity with him, Bloss then shared his story with the young man. Nils' father, Helmut Bloss, was a German driven out of Poland. He fled to Sweden where he pledged himself to Gustav II Adolph's predecessor, Johann III, becoming a Swedish Army quartermaster specializing in horseflesh. He found a

Swedish bride, and Nils arrived soon thereafter.

Nils was his father's pride and joy, showing an early talent for horsemanship and learning languages. Fluent in Swedish, German and Polish, Nils was accepted into service by King Gustav and rose to the rank of captain in a light cavalry regiment that also did scout duty. He had been an officer on the rise when he was wounded at the Battle of Breitenfeld in September, 1631. A musket ball in the side and a dead horse falling on top of him had left him near death. The regimental doctor had been quite good—he managed to keep wound fever at bay—but there wasn't much else to be done. Nils had been left in a small Thuringian village when the Swedish army marched to winter quarters. Local villagers took him to Grantville.

In conversations Bloss had had with Dr. James Nichols during his recovery, he'd gathered that the black doctor—who was not, in fact, a Moor, though he looked very much like one—wished he could do more. With a little regret, Dr. Nichols had explained to Nils that he would never have full use of the injured leg, though he would be able to walk again eventually, with the aid of a cane.

For his part, Nils was just grateful he didn't lose his leg and was ecstatic at the prospect of being able to walk again, even with a cane. Between the surgical repairs Dr. Nichols was able to make and the special exercises he had to do during his convalescence, he recovered more function in his injured leg than he'd dared hope. The Americans even had a wonderful medicine, "marijuana," to help manage the pain of recovery. He rather liked how he felt while taking it, though he was usually quite hungry afterwards.

Nils looked up and saw that he and Sergeant McDougal had been joined by a young lieutenant—German, by his looks—and a young woman with the single stripe of a private first class on her sleeve. She looked like she could be Russian.

"I managed to learn English fairly well during my recovery, even to read it and write it," said Major Bloss, winding up his life story. "I was always singled out for my scouting reports. I suppose that's why I was picked for this duty."

"Don't you miss campaigning?" asked Kurt von Kessel, the lieutenant, after he'd introduced himself. "I'm happy to serve any way I can, of course, but I'd rather be on the line. In battle."

Major Bloss smiled wryly. "A part of me misses campaigning, to be sure. Especially with His Majesty. But let me tell you, Lieutenant, battle loses its romance when you have a sore ass and people are shooting at you. Or when your dead horse lands on top of you."

"If you ride well, I find it is much easier on your backside, sir," said the young woman. Her blue eyes sparkled with humor. Despite her Russian looks, she spoke German with a distinct Swedish accent.

"True enough, Private . . ."

"Anderovna, sir. Svetlana Anderovna."

"True enough, Private Anderovna. Though I pride myself on having an excellent seat. It could be, however, that my bottom is bonier than most peoples'."

Bloss's joke at his own expense brought general laughter. He scanned the room and did a quick head count. All the recruits were here; it was time to get down to business.

* * *

Private Svetlana Anderovna listened to Major Bloss with rapt attention. Most of the meeting was spent explaining the structure of the newly formed Joint Armed Services Press Division and what was to be expected of them. They were to draft press releases for area newspapers; they would provide positive and morale-boosting stories to make the military look good; they would answer questions from the press when needed; and finally, they would be the first line of defense for the inevitable scandals. Their other major duty would be to clear all requests for interviews with any uniformed personnel, regardless of rank.

"From the rawest, newest conscript all the way up to General Torstensson, that's the rule," said Major Bloss. "For the most part the lieutenants or their adjutants in the local offices will have authority to approve or deny requests for personnel stationed in their area. Any interview or statement requests for the General Staff should be handled by myself and the press division staff here in Magdeburg."

John Sterling, on loan from General Jackson to help with the meeting, handed out assignments. Magdeburg had the largest press office, with six assigned personnel, including the major. Grantville would have four people, with the others being scattered by twos and threes throughout the USE. Where possible, the press division offices would have personnel with fluency in German, English, and Swedish. Svetlana looked at her assignment. She was being posted to Grantville! She would be their resident Swedish speaker.

She left the next day with Lieutenant von Kessel, Sergeant McDougal and a German private named Drucker. Svetlana Anderovna couldn't believe she would at last be coming to Grantville. She had been dreaming about this place for a very long time, ever since rumors of its arrival and its role in King Gustavus' great victories had reached the Swedish farm where she'd grown up.

Svetlana, Sveta as she was usually called, was the illegitimate daughter of a prosperous Swedish landowner. Her Russian mother had been hired by Anders Jensen to tutor his four sons; a casual dalliance between the two of them resulted in Svetlana's birth.

Her mother died when she was five, but despite that Svetlana's childhood hadn't been terrible. Her relationship with Anders' wife wasn't warm, but the woman treated her well enough. It might have been different if she hadn't been a girl. Svetlana had long suspected that her father's wife tolerated her only because she posed no possible threat to the inheritance of her sons. But toleration didn't mean that Mrs. Jensen took special care with her upbringing and education, and Anders didn't care enough to go against his wife. There was no tutoring in the arts or other feminine pursuits for Svetlana Anderovna.

She grew up straight, tall and not particularly ladylike, the only girl with four boys. Her half-brothers showed her how to ride horses and enjoy the outdoors; and if her father didn't care to provide for the learning and refinement that would have been expected of his legitimate daughter, Anders at least made sure Sveta was literate. By the time she was seventeen, she could read and write in her native Swedish and was proficient, if not fluent, in German.

It was in her seventeenth year, 1632, that Sveta first heard of Grantville. What interested her most was the story of one of the Grantvillers in particular, a young woman about her own age. This woman—it was said—could strike people down from an unbelievable distance with her musket. She had, or so the story went, saved the life of King Gustav himself, and in gratitude the king made the girl a baroness.

Sveta soon found out the stories of Julie Mackay, for that was the name of Sweden's newest noblewoman, were true. She decided that she would travel to Grantville and seek to enter Baroness Julie's service.

It took her a while before she was able to convince her father to approve this plan, but he finally did. Anders made arrangements in the spring of 1633 for his daughter to travel to Germany with one of her half-brothers, who had decided to join the military. Sveta's journey went well, but by the time she reached Magdeburg in the late spring of 1633, she found out that Lady Mackay was gone. She had gone with her husband to Scotland to attend to some family matters.

Sveta resolved to stick to her plan and searched for gainful employment in Magdeburg to sustain herself until Julie's return. She decided that if she couldn't work for Lady Mackay personally, she'd try to join the rifle company Julie had commanded. Sveta was allowed to enlist after passing rigorous physical tests and tried to secure a place in the Thuringian Rifles—even though she'd never so much as touched a firearm in her life. Sveta turned out not to be a terrible shot—she didn't have the bad habits experienced arqebusiers tended to pick up—but she wasn't good enough to qualify for the rifle company. She ended up being used in a number of noncombat roles before landing in the press division.

After they arrived in Grantville, Sergeant McDougal gave her, Lieutenant von Kessel and Private Drucker a tour of this town of wonders. The lieutenant, Sveta learned, had been to Grantville briefly on a few occasions, but had never had the time for an in-depth exploration. Svetlana was starting to develop a liking for the shy sergeant, who turned out to be an excellent guide. Her only real regret was that a friend of Sergeant McDougal's—an Italian girl named Prudentia—who was apparently an artist of some kind joined the three of them. Sveta wondered what the tie between her and the sergeant was; they didn't seem to be betrothed. Perhaps she would ask when she knew Sergeant McDougal better.

The tour took in Leahy Medical Center, the main police station, the army base and the rooms set aside for the press corps' office. More interesting to Svetlana were the centers of social life: the school, the libraries and the churches. They stopped for coffee and pastry at the Sternbock Coffee House, and the tour ended with dinner at the Thuringen Gardens.

By way of thanks, Lieutenant von Kessel picked up the bill for dinner, after which Kurt excused himself for the evening. He'd taken what the up-timers called "bachelor officer quarters" until he could secure more agreeable lodgings for himself, and Sveta had been assigned space in the women's barracks. Private Drucker was leaving also. She was disappointed that Jabe was staying behind with Prudentia, but she couldn't graciously decline Lieutenant von Kessel's offer to walk her back to base.

Grantville, Midwinter, 1634

It was a pleasant night, pleasant at least for February in Thuringia. Jabe recalled that the winter of 1631-32 had been quite a shock to himself and his fellow up-timers. Not only were they considerably farther north than they had been when Grantville was in West Virginia, but they were smack in the middle of what up-time historians had called the "Little Ice Age," which had begun some two centuries prior and would continue for another century, give or take. After the high school had been saved from the Croat raiders, there had been a wave of interest in Swedish and Scandinavian history. Jabe had learned about the Little Ice Age and its presumed role in the death of the Viking colonies in Greenland.

But he and Prudentia both felt warm enough as they walked hand in hand to the Nobili house.

"I've been thinking, you know," said Prudentia.

"About what?" asked Jabe.

"About things between us. I hated that you had to go to Magdeburg after we fought."

"That was a fight? I thought it was a difference of opinion."

The look she gave Jabe was a mixture of affection and thoughtfulness. It was time, Jabe realized, for "the talk"; specifically the "where is this relationship going?" talk.

And to his mild surprise, Jabe found he wasn't entirely dreading the prospect, in spite of their recent difficulties. That, in fact, he was even looking forward to it. They had been more than friends the last few months, a couple to be sure, but they had never talked about being exclusive—though Jabe had certainly never desired to date anyone else.

"It's funny," Jabe said, "General Jackson said something about you being 'my lady' when I was in Magdeburg." Jabe had been thinking about these things even before Frank said this; he was simultaneously relieved and anxious to know that Prudentia had been having similar thoughts.

"And how did that make you feel?"

"Pleased, actually. I told him I didn't know if you were mine or not. But I don't think I was being completely honest."

"I am relieved."

"Relieved?" Jabe stopped and looked at Prudentia. "Pru, what do you mean? You're not afraid I don't have feelings for you, are you?"

"I'm just afraid you don't think well of me. Your parents don't seem to." Jabe could see the tears threatening in her eyes.

Jabe had to swallow hard before answering. "I know you didn't mean to hurt Dad's feelings. He'll come around."

"It's hard for me, you know. I am trying to truly fit in, but it's very hard."

Jabe took Prudentia in his arms. For several long moments she clung to him. It seemed like she was desperate, as if Prudentia were afraid she'd lose him.

They resumed walking side by side, arms around each other's waists. Prudentia managed to melt into Jabe's side a little more.

"The entire time you were gone, I just felt so tense. Like I was missing something. Missing being with you. Touching you. Kissing you."

Taking the hint, Jabe obliged her with a lingering kiss. As they continued their walk, Jabe said, "I felt the same way. I was thinking that it was getting harder for me to imagine your not being a part of my life."

Their steps brought them to the Nobilis' front porch. They went inside and, after polite hellos to Tino Nobili, continued to the spare room that served as Prudentia's studio.

For a time all conversation ceased as they kissed—considerably less chastely than they had been accustomed to kissing up to this point. They broke off and for a few moments said nothing. Jabe was

deep in thought.

"You know," he said, breaking the silence, "the Germans think we up-timers are nuts to get married so young. They don't believe in marriage until the couple is financially sound. I'm beginning to think that's not such a bad way to do things."

Prudentia laughed. "If I know you, James Byron McDougal, you will establish yourself younger than any German apprentice or tenant farmer. Besides, I'm not even through with school. And then there is my mother's approval."

"Mother's? I thought I'd need to talk to your dad. Or at least write to him."

Looking a little sad, Prudentia said, "Mother and Father went their separate ways years ago. I am hoping Mother will be able to make the trip from Naples soon."

"I guess I'll have to get cracking on my book."

Any anxiety Jabe might have had at the prospect of meeting Artemisia Gentileschi was driven out of his mind as Prudentia threw her arms around him and resumed kissing him. They obeyed their mutual rule of keeping their hands above their waists; even so, they were more adventurous this evening than they had ever been before. Prudentia, in particular, proved that she truly did have Roman hands.

Grantville, Late winter, 1634

Life settled down into a comfortable routine. Duty with the press corps suited Jabe far more than radio operator training did. His instructor had promised Jabe and his fellow Signal Corps trainees that they would dream in Morse code before long, but he never got the knack. He would have been, at best, a competent radio man.

But he was a very good press man. Jabe's talent for listening and drawing people out stood him in good stead, and Kurt von Kessel helped him hone his writing style into one more suited for journalistic writing. Some of Jabe's colleagues got mad whenever a lazy reporter simply passed off one of the division's press releases as a story; Jabe always took it as a compliment.

After the first couple months of its existence, even Frank Jackson had to admit the Joint Armed Services Press Division (as it was formally known; a Marine wag had dubbed them the Fightin' Flacks, and the name had stuck) was earning its keep. Most of what they did was routine. In addition to the duties Major Bloss had outlined at the first meeting, they conducted regular briefings with the press.

Military protocol had tightened considerably now that Torstensson was in overall command of the USE's troops. But in keeping with Major Bloss' command style, things tended to be looser in the Joint Armed Services Press Division. The Grantville office was no exception. Aside from times when formality was required, the four Fightin' Flacks stationed there were on a first-name basis, except for the dour Private Drucker. He was simply known as "Drucker."

Work was starting to pick up. Winter had passed, and the time for the spring campaigns would soon come again. Once the roads dried to something other than the consistency of slimy porridge, the army would on the move again. Until then there were many grand speeches being given and a great deal of morale boosting being done. On this particular chilly March day, Jabe and Kurt were writing up a release

based on a circular delivered by the main office in Magdeburg. The emperor had delivered a rousing address to the troops in Luebeck in anticipation of the coming campaign season.

"I wish," said Jabe to Kurt von Kessel as they worked on a statement, "we had a recording of this speech. Reading it can't be as exciting as actually listening to it. We could have had VOA air it and everything. Be good to have people hear Emperor Gustav."

Kurt looked at him thoughtfully. "That's not a bad idea. It'd be even better if we could have him give a speech on television."

"You're actually serious!"

"Come to think of it, I am. Your camera still works, doesn't it? Would it work away from Grantville?"

"Well, yeah. The battery'll go for about two hours on a charge, but—"

Kurt held up his hand. He was onto something good and didn't want to hear any objections. "So you could take it up to Luebeck? And what about something to put into the camera?"

"Tape, I think you mean."

"Yes, tape." Kurt had watched some of his adjutant's interviews and had seen him work his camera. Kurt knew generally how the device operated but was fuzzy on the details. "Do you have any left?"

"I can recycle some sure, but how do we get into Luebeck? The Danes might have something to say about that."

Kurt turned serious. "It's a risk that may prove too great. I'll send a letter to Major Bloss and see what he thinks. But if we can work out something reasonably safe, it really would be worth doing. An address from His Majesty, taped while under siege! It gives me chills just to think about it."

Jabe grunted. "It gives me chills, too."

Kurt nodded knowingly. "It wouldn't do to get captured by the Danes."

"It's not the Danes I'm worried about. It's Prudentia. She's going to go ballistic when I tell her."

* * *

Jabe put off telling Prudentia about the scheme to sneak into Luebeck. No use getting her upset unless and until Major Bloss officially approved the plan; there was a chance that the brass would decide sneaking in would be too dangerous. But when word came back from Magdeburg that the idea was approved, Jabe knew he had to tell Prudentia.

Her reaction was pretty much what he thought it would be.

"You're going*where* ?" A string of particularly rapid and pungent Italian followed this question. Jabe had been trying to learn the language, but when Prudentia got really wound up, she talked too fast for him to catch more than a word or two.

"There's some danger, but we should be okay. The Danes haven't managed to cut things off completely.

C'mon, if Anne Jefferson can get into Amsterdam, we can get into Luebeck."

Prudentia's eyes narrowed. "Who's we?" she asked in a dangerous voice.

"Some German Marine named Linn. He managed to make his way to Grantville through some hostile country, so he's been detailed to ride with us."

"Who else?" Prudentia practically hissed the question.

"Sveta."

The volcanic explosion of Italian that followed this revelation was even bigger than the first one. Prudentia had a dislike of the Swedish private that bordered on intense. Jabe chalked it up to Prudentia's prejudice; he believed her when she said was trying to work on changing her attitudes, but it still reared its ugly head from time to time, despite her best efforts. This, Jabe thought, was one of those times. It never occurred to him that she could just be jealous.

Prudentia ran out of Italian and returned to English. "Why her? Why not Kurt? Or Drucker?"

He sighed, irritated. "Pru, you know Kurt can't go into a potential combat situation. And Drucker doesn't speak Swedish. That leaves only one other possibility."

The cold silence greeting that statement was worse than the angry words Prudentia had used up until now.

"Look, Pru, I'm sorry you don't like Sveta. I don't really know why you seem to hate her so much."

"You don't understand a thing, James Byron McDougal, truly you don't. Just go. You'll be safe, I'm sure."

Jabe was angry now, a state he rarely achieved. "Will you even want to see me before I go?"

"I need to get to work."

* * *

Prudentia found she couldn't get right to work after Jabe left. She wasn't used to seeing him like that, and she blamed herself.

After she was done crying, she began to get a little angry, too. She knew Jabe thought she looked down on Svetlana Anderovna because she was a farm girl and illegitimate besides. He truly did not know her well at all if he thought that. Prudentia had an entirely different reason for not liking her. The Swedish woman definitely fit in with an up-timer's standard of female attractiveness, and Sveta's upbringing gave her more in common with Jabe than Prudentia's did. Jabe would probably decide that Svetlana was more suitable as a wife, and Prudentia was sure that Pete and Zula would like her better anyway.

As anger replaced grief and self-recrimination, Prudentia began working on her sketch for the frontispiece of*The Murder of Roger Ackroyd* . In her current mood Prudentia found it very easy to draw a dead man with a knife in his back.

On the Road, Late winter, 1634

The trip north to Luebeck was every bit as chilly, wet and muddy as the three soldiers feared it might be. The up-timers referred to it as "mud season." It was the time of year generals hated most because it was nearly impossible to move armies anywhere in the sticky morass. At least in winter the roads were frozen hard, and if a commander was particularly lucky, a frozen canal or river might make an excellent road if the ice was thick enough.

Marine Lance Corporal Dietrich Linn rode out in front, keeping an eye on the road ahead. Sergeant McDougal was the ranking officer in their little group, but that didn't mean he thought he knew everything. The press division sergeant told Dietrich that his more extensive experience riding through potentially hostile territory called for him to ride in the lead.

In order to get to Grantville Dietrich had had to travel through contested country. He came from Krefeld, a town on the Rhine that was a center of the silk trade. His family took their surname from the castle in which they'd worked as servants for generations; his mother was a baker. She was also considered quite beautiful and was not particularly discriminating in her choice of bedmates. Dietrich had no idea who his father was. He was probably good-looking, though. Dietrich had heard that others called him "the golden boy," and there had been serious talk about using his portrait for a recruiting poster. He'd done well in basic training and was far more proud of that fact than his good looks.

He didn't expect too much trouble. They were well within the USE, and the chances of encountering enemy raiders were slim. It was somewhat more likely they might come across bandits, but Corporal Linn was confident they had enough firepower to deal with robbers. Each of them carried a Struve-Reardon flintlock rifle and a flintlock pistol sidearm, per regulations. In addition to his general-issue weapons, Sergeant McDougal carried a .22 semiautomatic rifle, his own personal firearm.

"I know a .22 doesn't have a lot of stopping power, but I've been using it for a few years now. Since before the Ring of Fire," the young sergeant had explained. The three of them had been cleaning their weapons one night.

"Why prefer it to the flintlock if it's not as powerful?" Dietrich wanted to know.

"Part of it is rate of fire. This can put a lot of lead in the air in hurry if I need it to. But it's mostly because I can't shoot nearly as well with the flintlock."

"Why not?" asked the Swedish girl, Svetlana. Dietrich looked at her. He found her to be very pretty—she reminded him a little of his mother in looks. But she'd shown not the least bit of interest in him.

Sergeant McDougal grinned ruefully. "The SRG is a great gun, but my problem is the priming pan. It flashes right at the edge of my field of vision and causes me to jerk the gun the instant before it fires. Half the time I'm lucky if I can hit the broad side of a barn."

Dietrich nodded. Despite the fact that McDougal outranked him, the Marine corporal had at first looked down on someone who served in a noncombat role—a REMF, as his up-time Marine comrades put it. But during this trip he'd come to respect Sergeant McDougal. He had good instincts, as proved by the fact he used his up-time rifle. Dietrich knew that Sergeant McDougal's problems with the flintlock rifle wouldn't have been a consideration if he were in a line, firing in volley. But if the three of them got into a firefight with bandits, accuracy would count for far more.

The three of them passed some more time in conversation. Every attempt Dietrich made to get Private Anderovna interested in him was politely rebuffed. He decided to cut his losses and go to bed. Maybe next time, if she had more to drink, he'd have better luck.

* * *

Svetlana stayed in the common room with Jabe after Corporal Linn went to bed. She was used to her sergeant's reticence, but he'd been even quieter than usual lately. His explanation to Corporal Linn regarding his rifle was the most he'd said in days. She'd gotten to know Jabe well enough over the past couple of months to know something was bothering him.

"You've been quiet the whole trip so far," she said.

Jabe smiled a somewhat strained smile. "I just haven't had much worth saying."

"Something's wrong. I'm happy to listen."

Jabe sighed. He signaled to a serving woman for a tankard of beer; Sveta declined his offer to buy her one.

"What makes you think something's wrong?"

Sveta just looked at him, saying nothing. Jabe muttered something she didn't quite catch, involving the letter "x" and a longer word—"chromo" something.

"It's just that Prudentia and I had a big fight before we left Grantville. She didn't want me coming to Luebeck. It seems like we've been fighting a lot lately."

Svetlana tried her hardest to be properly sympathetic. She was sorry Jabe was in distress, but it did not sadden her in the least to hear that he and Prudentia were having problems. It made her hopeful, and she tried her absolute hardest not to let that hope show.

Anders Jensen had not been a terrible father, but the fact was he had not legitimized her. Nor would he, which is why Svetlana had adopted her Russian-style patronymic, "Anderovna," as her surname, dropping her mother's family name. She was Anders's daughter, whether or not he chose to officially acknowledge her. There would be no dowry for her unless she earned it herself. Almost everywhere this would have severely limited her marriage prospects. Her father expected to be consulted if she decided to marry, of course, but probably wouldn't care enough to make any objections to almost any prospective husband she might find.

In Grantville, though, her marriage prospects would not necessarily be limited by her bastardy or lack of a dowry. People there were judged on their merits. Gretchen Richter was a camp follower, and she married a respectable up-timer. Not only did Gretchen not have a dowry, she also had a lot of dependents. And Sveta knew Gretchen was not the only woman of her station to make such a match, just the most famous. It went both ways; after all, hadn't her hero, Julie Sims, been allowed marry a man who was—like Sveta—illegitimate? Granted, Alex Mackay was well-regarded by no less a figure than Gustavus Adolphus, but he was a soldier and Julie was the daughter of a respected town professional. And yet no one had raised any objections to the match.

Svetlana was beginning to feel, more and more strongly, that the young man sitting in front of the fire with

her would make an excellent husband. Prudentia Gentileschi was, in her opinion, stuck-up and spoiled. What did an artist's daughter have in common with Jabe, anyway? Svetlana knew that she was far more suitable a wife for Jabe McDougal than Prudentia Gentileschi.

Luebeck, Late winter, 1634

For Jabe, getting smuggled into Luebeck was an anticlimax. The siege was tight enough—movement into and out of the city was very restricted by the League of Ostend—but there were more than a few cracks to slip through. The mysterious (to the Danes at least) destruction of a half-dozen ships in the Truve River estuary had made them nervous and forced them to loosen their grip on the port at least somewhat—loosened enough so that it was possible to smuggle small amounts of supplies into the city.

People could also be smuggled. Jabe, Svetlana and Corporal Linn were conducted into Luebeck one dark, cloudy night and shown to quarters in the city. Sergeant Elizabeth Buchholtz, of the Thuringian Rifles, took charge of Sveta. The two women had met when Sveta had tried to get into the sniper company. Jabe and the German Marine were quartered with a friendly merchant family eager for news and gossip from outside Luebeck. Jabe, though tired, was willing enough to oblige as a way of thanking his hosts for the food and hot bath they provided.

Jabe had a hard time getting to sleep that night. The last few days he'd found himself confiding in Svetlana more and more, especially when it came to the problems he'd been having with Prudentia. Jabe had always been someone who preferred a handful of close friends to a large circle of acquaintances, but most of his high school friends were scattering, drawn into the military or the world of possibilities offered for up-timers in the rest of the USE. He considered Kurt a good friend as well as a CO, and Sveta had been especially friendly and interested in his problems.

There was a part of Jabe—a small part—that wondered if Svetlana Anderovna weren't more "right" for him than Prudentia Gentileschi. There were times when he wondered what he and Prudentia were doing together.

Whenever his thoughts began traveling down this path, Jabe began to wonder what his life would be like if Prudentia weren't in it. Invariably, he felt a tightness in his chest and a sharp pain began somewhere near his feet and corkscrewed up through him. On paper the son of a coal miner and the daughter of an important painter had no business being together. On paper, Jabe thought he and Svetlana made far more sense.

But Svetlana didn't make him feel that he could do anything he put his mind to. Jabe thought of a recent selection for the "Dinner and a Movie" club:*As Good As It Gets* . Prudentia made Jabe want to be a better person; he didn't have that feeling about Svetlana, or any other woman for that matter. Still, it was good to have someone he could exchange confidences with, and he felt he needed a woman's perspective on things. As he finally drifted off to sleep, Jabe tried to ignore the nagging feeling that he shouldn't be confiding these sorts of things to another woman.

* * *

One of the emperor's junior adjutants came to get Jabe the next morning. The weedy young Swedish lieutenant struck Jabe as very high-strung. Maybe he was one of those people who needed tension to keep him together. As the two made their way toward Gustavus' headquarters, Jabe laid out his plans for his brief stay in Luebeck. He started to speak in German, but the young officer said he wanted to

practice his English, so they used that language instead.

"I'm not worried about working around His Majesty's schedule, sir," Jabe told the adjutant. "I'm happy to take as much time as he can give me. And I'm also hoping to speak with some of the grunts and get their view of things."

"Grunts?"

"Sorry, sir. That's a slang term from up-time. It means the ordinary soldiers, the privates and low-ranking noncoms."

"Grunts." The Swede repeated the word as if tasting it. He smiled. "I rather like it. It has a sort of rough charm. How good is your German, Sergeant McDougal? His Majesty's English has improved a great deal in the last year or so, but it is far from his best language."

"I think my German's pretty decent, sir. I hope so anyway. Private Anderovna is a native Swedish speaker, so she can help me over the rough spots, if that's okay."

"I'm sure it will be."

They spent the rest of the journey through town going over protocol. Gustavus was far less touchy about such things than most monarchs, but there were still proprieties to be observed. Jabe didn't think he'd have any problems; his big fear was that he'd be so nervous in the emperor's presence that he'd be paralyzed.

* * *

Svetlana watched Jabe work. There wasn't much for her to do at the moment. Most of those present could communicate in German if not English, so aside from the occasional rough patch, Sveta wasn't needed as a translator.

The first task had been to find a well-lit room in which to tape His Majesty. Jabe explained that, while his camera had a built-in lamp, it would drain the battery relatively quickly. Once the battery was drained, the camera would not function without another source of power. Therefore, it was best to find a natural light source so that the quality of the picture would be as good as possible.

Svetlana was amazed that Jabe, normally so quiet, could be so assertive. Once a suitable room had been found, he sat the emperor down and began setting up his camera. Gustavus rehearsed his planned speech a couple of times, and then Jabe clipped a small device—a microphone—onto the royal personage. He connected the other end to his camera.

"I am told you have an excellent speaking voice, Your Majesty," Jabe said to Gustavus. "With this device, the microphone, you won't need to speak so loudly. In fact, if you speak too loudly, you may accidentally damage the equipment."

Gustavus understood, and they were ready to tape. The Emperor of the United States of Europe may not have grown up with television, but his magnetic personality and larger-than-life presence made him a natural in front of a camera. Svetlana had always been proud of her king, but for the first time in her life she understood why so many were willing to follow Gustav II Adolph Vasa even to their deaths.

When the emperor concluded his remarks, about a half-hour later, Jabe smiled.

"Nailed it on the first take, Your Majesty."

Gustavus' pale blue eyes twinkled. "That means, I trust, that I did well, Sergeant?"

Answering that question led to an explanation of what "take" meant, which in turn led to a brief explanation of the editing process. "Most people get nervous on camera, Your Majesty. They just seize up or make a lot of mistakes. You were very relaxed and natural. It's always possible to do things over and get them right, but for something like this I think it's best if you can get it right the first time. Which you did, Your Majesty."

Jabe was breaking down the tripod and stowing the little equipment he'd had to bring with him. Gustavus walked over and picked up the small camera, examining it closely. In the emperor's outsized hands, it almost fit in one palm.

"It does not seem such a fearsome thing to me, Sergeant. Far less fearsome, in truth, than Axel Oxenstierna."

Grantville, Late winter, 1634

Prudentia sipped her coffee, looking around at the Sternbock Coffee House. There was all manner of graffiti on the whitewashed wall; the cafe's proprietor, a distant Nasi cousin named Theophilus Mendes, encouraged writing on his walls. Someone had told him about an eatery in the up-time city of Chicago that did the same thing, and Theophilus liked the idea. It had helped cement the Sternbock's reputation as the main artists' cafe in Grantville.

With her sat a Bohemian named Karel Novotny and Tino Nobili's oldest son, Burton. Burton was there at Prudentia's request; she did not meet strange men alone, even in public.

Novotny had braved muddy roads to make an exploratory trip to Grantville from Prague on behalf of Morris Roth. Prudentia knew of the Cavriani family, who were professional "middlemen." Novotny was cast from the same mold. He seemed friendly enough, but there was something about him that was slightly off-putting. She was glad Burton was there with her. Prudentia handed him the various sketches she'd made for the frontispieces.

The Bohemian examined the sketches critically. "Excellent work, Signora Gentileschi—or is it Stiattesi?"

Prudentia was a little surprised. Most people didn't know her father's family name unless she told them. Her estimation of Novotny's abilities went up for finding out that little detail, even as she felt a little uncomfortable.

"My mother is officially the head of my household, Signor Novotny; so I go by Gentileschi. And thank you for your kind compliment. You may keep the sketches to take back to Don Morris; they're copies."

The Bohemian handed Prudentia a draft for USE$3,000, half the agreed-upon price for the work. "Per your agreement with Don Morris. I will be returning this summer for the completed work, at which time you will receive the balance of the commission."

"Very good," said Prudentia. She tucked the bank draft into the pocket of her dress. "Thank you, Signor

Novotny."

Novotny, however, wasn't finished. "Don Morris has spoken well of your work. Apparently, he commissioned you previously, before he moved to Prague?"

"Well, it was a very small commission. I designed a logo for his personal seal."

"Be that as it may, Don Morris instructed me to extend an offer to you."

"I'd be happy to work for him again."

"Not to work," said Novotny. "To come to Prague. He wants to you to be an artist in residence at the Women's College of his new university."

* * *

Even as she walked to the bank to deposit her draft, Prudentia had to keep replaying what Karel Novotny had just told her over and over in her head, just to make sure she hadn't imagined it. It was a tremendous opportunity. And yet . . .

If this offer had come to her just a few weeks ago, before Jabe left for Luebeck, she would have turned it down flat—unless Jabe agreed to come to Prague with her after his military commitment was fulfilled. She couldn't imagine not having Jabe at her side, for this or anything else.

Now, though, she was sure that Jabe wouldn't ask for her hand. Ever since his departure for Luebeck, Prudentia had become increasingly certain that Svetlana Anderovna would replace her in his affections. She didn't like to think about it; the last few weeks she'd thrown herself into her art as she never had before. At least when she was painting or sketching, her mind was occupied with other things, better things. Besides, on a blank canvas or sheet of paper, she could make the world into whatever she wanted.

In her dark state of mind, Prudentia saw Morris Roth's offer not as a career opportunity but as a way out. If she were in Prague, Prudentia thought, she would not have to see Jabe and Svetlana together. She would have to get her mother's approval, but she didn't think Artemisia would object. It would take a little time for her to write to Rome and get word back, but Signor Novotny had told her she didn't need to decide until this summer, when he came back from Bohemia for the completed frontispieces. There was no reason, however, that she couldn't tell Jabe of her plans when he got back from Luebeck.

On the Road, Late winter, 1634

In spite of all the dangers, the trip to Luebeck had been exhilarating to Jabe. He truly felt that he had done something that would lift people's spirits. Not to mention the fact that he had gotten to meet, even talk with, the emperor himself!

He was in Luebeck for a week all told, and Gustavus had invited him to dinner—something Jabe knew was a tremendous honor for someone of his rank. Gustavus, as he usually was about up-time technology, was curious about video. Jabe was happy enough to share what he knew, though he pointed out that he was hardly the most knowledgeable up-timer when it came to film and television.

Jabe mentioned to the emperor in passing about his oral history. To his great surprise, on the morning of his departure from Luebeck, a young boy delivered a sheaf of papers to him. Written in German in a strong, sure hand were the reflections of Emperor Gustav II Adolph Vasa about the Ring of Fire; in his case, his thoughts when he first heard about Grantville's arrival and his memories of his first meeting with Rebecca Stearns, Ed Piazza and especially Julie Sims. This alone would make sure that Jabe's book, when it was finished, would move at least a few copies.

The weather on the trip back to Grantville was dismal. It rained almost constantly, and keeping the gunpowder dry was a challenge. The plan was to reach Magdeburg and then take a boat to Halle. From there they would take the train to Grantville. The day he, Sveta and Dietrich thought they might arrive in Magdeburg, there was a particularly torrential downpour, and no one seemed eager to push on. They found an inn and decided to spend the night there.

The inn was an old manor house. The petty nobles who'd lived there had fled the war years ago, leaving their stewards behind. As a result, Jabe found, the rooms here were much nicer than in most inns. He had a room with a fireplace and didn't waste any time getting a roaring fire going. He put the soaked clothes he was wearing in front of the fire, along with the damp clothes that had been in his pack.

To pass the time as his clothes dried, he piled blankets on himself and decided to work on a story to accompany the emperor's taped address. The main thrust of the article would be to highlight the bravery of the soldiers in Luebeck as they endured life under siege, though Jabe had to spin things more than a little. He found out that, since they had antibiotics in Luebeck, the biggest enemy was boredom.

He was interrupted by a knock on his door. "Um . . . come in?" Jabe shifted the blankets to make sure he was covered. The door opened and Svetlana walked in, wearing only a very thin shift.

* * *

Svetlana noticed that Jabe was in much better spirits now than he'd been in on the trip to Luebeck. Part of it, she knew, was the writing he'd gotten from Emperor Gustav. That would be enough to lift anyone out of melancholia. But there was more to it, she was sure. It was as if some great weight had been lifted off him.

After watching Jabe with the emperor, Sveta was more determined than ever to have him as a husband. He embodied the qualities she had come to cherish about these up-timers every bit as much as Lady Julie Mackay. Jabe, shy as he was, had acted with confidence when he interacted with the emperor. He was properly respectful and obedient to protocol at all times, but there was something he had that the Swedes surrounding Gustavus lacked. An indefinable sense of self-worth that told Jabe McDougal that, while the emperor was his leader, elder and monarch—and therefore deserving of great respect—Gustavus was not an inherently better human being than he was. Svetlana, who'd fought against feelings of inferiority all her life, loved that.

She looked at herself in the full-length mirror that stood near the fireplace in her room. It didn't match the rest of the furniture, being in rather shabby condition. Probably a purchase from Grantville, she thought. She returned her attention to the reflection staring back at her. She was lean and muscular, skinny by down-time standards, but Svetlana knew she seemed to fit the standard of beauty many up-time men had.

Perhaps, Svetlana thought, she could bind Jabe to her with her body. If it had been anyone but Jabe, she would have thought it not worth the risk. Svetlana was not a virgin, though she was not greatly experienced, and knew what could happen if a man got a woman with child and then didn't marry her.

Jabe, though, was far too honorable to abandon her if that happened. He'd probably stay with her even if she didn't get pregnant.

Most of Svetlana's clothes were drying in front of the fire, but she found a shift that was dry enough. Making sure the hallway was clear, she went to Jabe's room and knocked on the door.

* * *

"Sveta, what are you doing? Is anything wrong?" Jabe asked. He was more than a little flustered. The shift she was wearing did little to conceal her trim body.

"Nothing's wrong," she said, as she walked over to the bed. She sat down, facing him.

"I'm not sure this is a good idea. I mean, I'm your superior; there's probably rules against—"

She shut him up with a scorching kiss, and at first Jabe couldn't help but respond. He liked Svetlana, and no one could deny she looked good. With a supreme effort of will he broke away.

"This isn't right."

"Why not?"

"It just isn't, that's all."

Svetlana looked at him with those blue, blue eyes of hers. "Please don't send me away. Please?" She took off her shift.

Jabe swallowed hard twice. A thought from some reptilian part of his brain surfaced: Why not? Prudentia wouldn't have to know. He forced the thought away. It wasn't that he was a prude about sex or even that he had a religious reason for waiting until marriage. But Jabe didn't want to remember his first time with shame and regret, which he surely would if things went any further with Svetlana right now.

"Sveta, put your clothes on. Please."

"But why? If it was Prudentia, not me, you wouldn't be holding yourself back!"

"No," said Jabe truthfully, "I probably wouldn't be."

"I would be a good wife for you."

"But you're not the one for me, Sveta. It wouldn't be fair to either of us."

"Why her and not me? We have so much more in common."

"I don't know. I don't know if I can put it into words. Prudentia just makes me feel . . . well, she makes me feel like I can do things I wouldn't have thought I was able to do. It's like she fills in a part of me that I need."

"And I don't." The note of finality in Sveta's voice didn't really need a response. She knew what his answer would have to be. She put her shift back on.

"Look, Sveta, we don't have to tell anyone else about this, okay?"

She said nothing, only nodded.

Grantville, Late winter, 1634

Prudentia felt numb inside. She kept trying to tell herself she was happy. Between what she herself knew of Morris Roth and the events in Bohemia over the last few months and what Karel Novotny had told her of the new University of Prague, every instinct she had told her that accepting his offer would be career-making. And yet . . .

And yet she was utterly miserable. She hadn't eaten well in days; Tino and Vivian Nobili were worried and were after her to see the doctor. They were concerned that she was sick. They were right—she was sick, though not in the way they perhaps thought. It was worse today; Jabe was due back and would arrive on the train from Halle at any time. Prudentia was sure that he would come to the Nobilis' to tell her that his courtship was ending. She'd already decided that before that could happen, she would tell him she would be leaving for Prague by the end of the summer.

Just as she thought he would, Jabe showed up, looking rumpled and travel-weary. He smiled when she opened the door.

"I'm so glad to see you, Prudentia."

"I'm leaving," she blurted out, with no preamble. "I'm going to Prague this summer."

Jabe's jaw sagged. He dropped his pack in shock.

Seeing Jabe's reaction, a little bit of hope flared inside Prudentia. She tried to ignore it. She didn't want to be hurt. She expected Jabe to say something, anything, but the silence seemed to stretch on for eternity.

She decided to fill that silence. "I wish you and Svetlana all happiness. But I can't be here to see you two together."

"What, but, ah . . . Svetlana? What are you talking about? You can't go to Prague!"

Hope flared again, and this time Prudentia didn't try to suppress it. "Why not?"

"I don't know. Maybe you can. But I'll have to come with you. Even if I have to desert, I'll go with you."

Looking at Jabe, Prudentia knew he wasn't kidding. Tears came to her eyes and overflowed. "You would go somewhere where you don't know anyone?"

"I'd know you. And Mr. and Mrs. Roth. Sort of. But I can't be apart from you. Is that what you were afraid of? That I was going to leave you for Svetlana? Why, for heaven's sake?"

"You do have a lot in common with her."

"Yes. But she doesn't make me feel the way you do. I don't think anyone could." Jabe looked at her.

"I'm serious. I'll go to Prague with you if that's what you really want."

Prudentia kissed him then. "Let's not be hasty. I think I will tell Don Morris no—for now. Perhaps in the future, if he is still willing. But I would not ask that of you."

They kissed again and then just spent time together. Not talking or doing anything else. Just reveling in each others' presence, and that was good enough.

Grantville is Different

by Russ Rittgers

It was late August, 1632, when Georg Bauer climbed out of the ditch he'd been digging for Jena's new sewer line. Sweat was still pouring off him when he first heard about Grantville.

Almost twenty-two, with dark hair and a strong build, Georg was the fourth son of a farmer who threw him out after he beat one of his brothers senseless. His older brother had been an overbearing bully and Georg knew his father would never willingly let him leave the farm without a major cause. So he gave him one. Georg soon found a small town and was a tough for a year until it was destroyed by one of the passing armies. Escaping unhurt, he joined another army as a mercenary. After almost dying of camp fever three months later, Georg decided any place an army wasn't in Germany would be healthier. So one night while he was supposed to be on guard duty, he slipped away, ending up in Jena ten days ago.

Georg poured cup after cup of water down his throat during his break. "Hans, who's the big blond with the short hair talking with the boss?" he asked one of his fellow ditchdiggers.

"That's Herr Chip Jenkins," Hans answered, taking a quick glance. "He works with the Jena Committee of Correspondence. He drops by here every now and then. He also does some administrative work for this project. I hear he's also the son of a rich landowner in Grantville. Came here less than a year ago. After the Americans captured that small mercenary army."

"Grantville? Doesn't sound German."

"You're right. I hear some witchcraft dropped the entire town west of Rudolstadt. They call themselves Americans and say they're from across the Atlantic Ocean. Some say that no one has to work hard there, there's as much light at night as there is in daytime and they have carriages that don't need horses. Bunch of crap, I say. You want to find out about it, ask Herr Jenkins. Break's over," Hans said when the bell rang again. He picked up his shovel and jumped down into the ditch.

That evening at the crowded Crazy Fox tavern, Georg was hesitant about walking up to Herr Jenkins and asking anything. The Crazy Fox had a different feel. It took several moments to figure out why. Then it came to him. It was the women! Granted this wasn't a low tavern but somehow the atmosphere was different from the usual respectable neighborhood tavern as well. There was more . . . vibrancy. Here, while there were barmaids and a few women who looked like they might be prostitutes, there were many other women—maids, laundresses, common working women, wives of working men, older and younger women. In fact, he didn't take a count but there seemed to be far more women in the room than men and they seemed to be in anticipation.

Herr Jenkins was standing near a table with a small mug of beer in his hand. For one with such a

position, he seemed remarkably accessible. He was joking with the men and women, occasionally winking humorously. He was not slim but Georg could distinguish a muscular body under his clothing. Tall, inches taller than Georg, Herr Jenkins didn't act at all like a wealthy landowner's son. Certainly not the one whose father owned the land Georg's father and brothers farmed. Arrogant snot. Perhaps like Georg, Herr Jenkins had been thrown off the land.

Then what looked like a rough customer carrying a short quarterstaff walked in. He tapped on Herr Jenkins' shoulder, said something into his ear and Herr Jenkins followed the man out the door. Since two or three other young men, all dressed like the local students followed, Georg did too.

Out on the dark street, a young man who'd obviously had too much to drink was singing loudly and off-key. He wasn't dressed like most of the local workmen but rather like one of the university students. Herr Jenkins walked over to the young man. Facing him, he put his hands on the student's shoulders. He softly talked for a short while before hugging the student to his chest and then putting his arm around the student's shoulders. The two young men walked away towards the city gate.

"What was that all about?" Georg asked the student next to him.

"One of Chip's old students just found out today that he's come into his inheritance," the young man said blandly. "Kurt was happy to be his own master but on the other hand, he didn't want his father to die. Besides, this means he'll have to leave the university and go home to manage his late father's estate. So he was very drunk."

"Oh . . . I didn't know Herr Jenkins was a professor."

"He's not. He's a docent, a teacher at the university, but all of his students are close to him," the other man said and turned to go back to the tavern.

Half an hour later, the same young man stood up at the end of the tavern. "We're going to start a meeting of the sanitation subcommittee shortly, so those of you who don't want to learn about why you should keep flies off your food may leave." Georg looked around him as several workmen grimaced and finished their meals quickly before leaving. Most of the women on the other hand, took places at the tables nearest the young man.

Just as Georg stepped into the street behind the departing workmen, Herr Jenkins approached the tavern. "Uh, Herr Jenkins?" Georg asked, taking off his hat, holding it nervously between his hands.

"Yes?"

"Uh, Herr Jenkins, I, uh, was wondering. I mean, my name is Georg Bauer and I, uh, just started working here in Jena, uh, digging the ditch for the sewer . . ."

"Go on."

"Uh, Herr Jenkins, I, uh, wanted to know about Grantville. Is it true what they say?" he blurted out. "I mean, witch . . . no, uh, by some means and uh, lights that . . ."

"Probably," Chip answered humorously. "No streets of silver, though. It would be easier for you to just go there for a few days than for you to believe what I'd tell you. Not everyone who goes there wants to stay because of our different customs. It is very different from Jena. If you want to work and are prepared to change, there are jobs that will pay much more than what you're making now."

"Uh, thank you, Herr Jenkins," Georg answered quickly. "Uh, I hate to ask but, uh . . ."

"If you want to leave the work here to go to Grantville, I can probably persuade your boss to hire you back on. In fact, come on inside and I'll write you a note of recommendation to someone I know."

Georg couldn't believe his luck. Herr Jenkins was going to recommend him? After just meeting him? Fantastic!

Chip got a piece of paper from Jan, the tavern keeper and scrawled a quick note. He folded and was about to seal it when he looked at Georg. "I assume you don't read or speak English. This is a note to the head man at one of the businesses my father owns. It gives your name and says you've been working here as a ditchdigger." Chip used the wax from a candle to seal the note. "Follow the Saale down to Rudolstadt. When the river bends to the south, follow the road that goes west. Ask anyone on that road where Grantville is. When you get to Grantville, ask anyone where the Laughing Laundress Company is. Do you have all that?"

"Oh, yes, sir. Thank you, Herr Jenkins." Georg tucked the note in his pouch. "Thank you. Thank you," he repeated and practically ran out the door.

"Who was that?" Jan asked.

"One of the ditchdiggers." Chip sighed. "Give you two to one odds that he'll be back in Jena in less than a week."

"I don't make sucker bets," Jan said, chuckling.

* * *

As soon as Georg saw the macadam road, he knew Grantville was definitely different. He tried to imagine how many men it must have taken to build such a wide, flat, smooth road and shook his head. He also had no idea what was the purpose of the double yellow stripe in the middle of the road. Guards had stopped him shortly after he'd turned west. After answering a few questions and having a medic look at him, he was free to proceed to Grantville.

An old man with a donkey pulling a small cart loaded with produce was passed through while Georg was being questioned and inspected. Georg quickly overtook him. The man seemed happy for some company.

"That's the school over there where the older students go," the old man said, waving at a large brick building above them on the hillside a short while later. "Few weeks ago, Gustavus Adolphus himself rode in with his cavalry. Killed a bunch of Croat cavalry who had come to slaughter the children in the school. One was my Martha. She's sixteen now. But between the men, even some women of Grantville and Gustavus Adolphus' men, they killed lots of those bastards."

"You mean, you let your girl that old go to school rather than making her work at home or somewhere else to earn money? How can you afford it?" Georg asked, surprised.

"Why not?" the man asked with a twisted smile. "Don't cost me nothing and girls are just as smart as boys. Well, I don't know that for a fact but my Martha's smarter than her two older brothers. Speaks English now and is talking about becoming a bookkeeper, too. I was farming here and we were visiting

my brother in Rudolstadt when what they call the Ring of Fire happened. Practically everyone our family knew was gone and this place was here instead. Some call it witchcraft but I don't know. I didn't know of any witches living anywhere near us. There aren't any here in Grantville as far as I can tell."

As they walked into Grantville, the old man said, "Would have moved, but where to? I don't like Rudolstadt anyway. Besides, Grantville took care of us, gave us a nice house to live in when we came back. I won't say I like not farming, but Grantville's not that bad once you get used to its strange ways. Martha's in school and both my boys are working in jobs that don't require them to be apprentices."

"Do you know where the Laughing Laundress Company is?" Georg asked, looking at the address on the note.

"Just over there," the man said, pointing to a sizeable one-story building with large glass windows in the front. "Looks like it's open."

There were eight Germans sitting on opposite sides of a workbench in the huge room, half of which had been closed off by an eight-foot wall. Each man performed a particular task having to do with two cylinders of wood. Then he'd pass the partial assembly to the next person.

"Hello?" Georg called.

An older man wearing light brown trousers which fell to his ankles and a soft green shirt with two buttons below the neck walked stiffly up to him. Georg hadn't noticed the door on the side of the workroom. "Hello," he said softly in an accent more pronounced but like Herr Jenkins'. "What can we do for you?"

"Hello, sir. I have a message from Herr Chip Jenkins in Jena." Georg held up the note.

The man glanced at the name on the front and gave a small frown before opening the note. "Hmm. Well, fortunately for you, Johannes decided to move on to where he could make more money. Of course, it's harder work as well, so . . . Bernhard! This is Georg Bauer. Show him what needs to be done and give him the usual rules. Get him settled in town."

"Ja, Herr Jenkins." Bernhard was in his mid-thirties with a deeply lined face, dressed like an American with a short-sleeved shirt and narrow-legged long trousers made from a material Georg didn't recognize. "Come with me."

Georg couldn't help but stare at the back of the man who was walking to the glassed-in room. "That is the father of Herr Chip Jenkins? The landowner?" he asked, puzzled.

Bernhard shrugged. "He is Herr Chad Jenkins. He owns this company and has many properties. His son works with the CoC in Jena." He looked over at Georg, seeing his expression. "Don't look so stupid, standing there with your mouth hanging open. Grantville is different."

"So everyone keeps telling me," Georg muttered.

It was midafternoon when Georg arrived. By the time six rolled around, he was hungry. "Where did all those women come from?" he asked, seeing several walk out the exit towards the road ahead of them.

"They work on the other side of that wall making washboards. You must have heard their squawking," Bernhard said. "This way neither the men nor the women distract or bother one another while they work. We don't see much of them during working hours, even have different lunch times."

"Speaking of food, where can I go to eat?"

"There are many places but do not go into the Club 250. They do not like Germans. Besides, they don't have any food except beer and pretzels." Bernhard waved a hand. "But let's get you a bed first. Grab your bag. I'll take you over to the workingman's dormitory. There is no public bath but there are what they call showers."

Bernhard led him to the dormitory a short walk away. It was a large three-story brick building. An old German with one arm was sitting behind a desk. He was dressed American-style in a plaid shirt that buttoned down the front. "Name?" he wheezed. He dipped his quill into the ink.

"Georg Bauer."

"How long will you be staying?" he asked, looking up from the form he was filling out.

Georg shrugged. "A week at least. I don't know. I just came from Jena and started work today." The old man wrote down where he came from.

"Where are you working?"

"The Laughing Laundress." The old man nodded and wrote that down.

"Two dollars per night or ten dollars for a week," the old man said, putting down the quill and lifting his palm expectantly. "Won't find a bed anywhere for less. If you have any valuables, I can put them in the cage. No swords, pistols or other weapons in the dormitory. I lock them up here. You can keep your dirk."

After a short discussion, Georg handed over his money and got some American change. "Brigitta!" the old man called.

A yawning woman wearing a long skirt and a linen blouse came out of the room behind the desk. A comfortably fleshed dark blonde and not unattractive, Georg noticed. Probably getting a little sleep before working tonight if she's napping now, he smirked.

"This is Georg Bauer. Put him in room 302. Bunk seven."

"Come." The woman led him down the hallway to the stairs. "One day they will fix the elevator but until then we use the steps," she grumbled and began climbing. Georg had no idea what an elevator was but following two steps behind her, his mind imagined what lay beneath the skirts not far from his eyes.

Once on the third floor, Georg walked next to her and smoothly slipped his arm around on her hip. "Will you come see me tonight, darling?" he asked.

Without commenting, Brigitta reached down, gripped the middle finger of the hand on her hip and bent it back.

"Aahh!" Georg yelled, going to his knees as she turned towards him, cruelly pressing his finger and hand backward. "Let go! Please!"

"A lesson to you, good sir," Brigitta said, releasing his finger. "There may be prostitutes in Grantville but

let them find you. Never, but never, make an assumption that any woman, no matter how she is dressed or where she works, is a prostitute. Is that clear?"

Georg's eyes were watering as he worked the finger. "You might have told me before!"

"Of course." She smiled wickedly. "But you'll remember it so much better this way. You can see the room number above the door. 302. Your bunk is number seven and you can see the number on it from here. Remember its location. If someone finds you sleeping in his bunk, you may lose some teeth. There is a cabinet for each bunk and yours is number seven. The showers are at the middle of the hallway and . . . wait, I'll have to show you. Put your bag in your cabinet and join me down the hall."

A few minutes later Georg was standing inside a room as large as his own bunk room. There were colored tiles on the walls and it had a strange smooth rock floor. At a level just above his head there were four spaced pipes sticking out from the wall with something bell-shaped at their end. Two knobs were on the wall below each pipe and a square opening was built into the wall above the knobs.

"This is how you turn on the shower." Brigitta stood to the side and turned one of the knobs. Water sprayed out of the bell-shaped device. "There are two knobs. The one I just turned on, the one on the right, is for cold water. The one on the left is for hot water. You can adjust the temperature of the water coming out to your liking. Clear? When you are finished, be certain no water is coming out of the shower head. We do not waste water here."

Georg thought he understood but figured he could watch or ask someone else when he took his shower.

"One more thing," Brigitta said, with that nasty smile of hers. "There are four showers in this room, the only one on this floor. Only one person per shower. Try to share and people will think you're . . ." She gave a sign for a homosexual. "Wait in the hall with a towel around your waist or in your trousers or go back to your room. Use a towel to dry before you leave the shower. People slip on these floors and there's enough dirt on them without making mud. I have enough work to do. Understand?

"The hallway lights come on at sundown and go off an hour before midnight so everyone can get a good night's sleep. At dawn a bell will be rung so everyone can get to work on time. Any questions?"

Georg had a thousand but decided he'd try showering now that men were coming into the hallway from where they'd been working.

Half an hour later, freshly showered, he joined Bernhard at the door of the dormitory.

* * *

The Thuringen Gardens was busy when Bernhard and Georg walked in. "It's always like this from middle afternoon until late at night," Bernhard explained. The waitress bent forward next to Georg showing a generous cleavage as she set the quart-sized beer mugs before them. Georg was about to slip his arm around the woman's bottom as he often did in taverns but as he reached out, a twinge from his finger reminded him that Grantville was different. He carefully withdrew his arm. Bernhard was sitting across the long table from him. The corner of his mouth curled up slightly.

"That'll be five dollars," the waitress said. "Would you like to order a meal?"

Georg did a quick calculation and was horrified. So much for a beer? That was more than triple what it cost in Jena! More! How much had they devalued the money here? Did he even dare to spend his good

Jena money?

"Order what you want, Georg." Bernhard smiled at the look on Georg's face. "I'll buy your meal tonight and you can return the favor after you get your first pay. They have herbed roast chicken, which is very good but that you can buy for yourself. The dish is expensive but the price has been coming down in the past month or two as more people have begun raising chickens."

Georg ordered first. After Bernhard put in his order for a round of cooked ground beef on a bun and pickled red cabbage, he continued Georg's orientation. "I guess someone must have told you that grabbing the ass of a waitress in Grantville is not a good idea."

Embarrassed, Georg told the story of his brief encounter with Brigitta to Bernhard's amusement.

Bernhard grinned and leaned forward with his forearms on the table. "You got off easy. I've met her before and she knew you were new to Grantville. She's attended several unarmed combat classes. Easier than using a knife on someone who wants to get too friendly, you know. If I or most of the other men around us had done that, I might have gotten a look of what's between her legs. Of course, her foot would have been standing across my throat. Not worth it. Not worth it at all." He chuckled and took a large swig of beer.

Georg shrugged. "Everyone tells me that Grantville is different. How much different?"

Bernhard looked around for a moment. Then he pointed towards a large table in a back corner where eight people were dressed in American and German clothing. "See that table? The new principal of the school for teenage children, the last having been killed in the Croat raid a few weeks ago, is sitting there. Another man is the manager of the steel plant in Swarza along with his wife who is also highly educated in physical mechanics. Another is Herr Wesley Jenkins, the brother of our employer and a senior civil servant. There's talk of sending him somewhere else in Germany whenever Herr President Stearns and King Gustavus Adolphus come to an agreement. The woman sitting next to him is a German who's a widow from Badenburg but who has also been working with Herr Wesley. The woman next to her used to be a camp follower but she's with the CoCs now. The last man is a Scottish weaver, specializing in wool.

"Now name me a place in the world where you can find such a diverse group that isn't traveling or drinking heavily. Each and every one of them is working hard not only for themselves but also to better Germany as a whole. Think about all the people you've ever known. Where else have you ever seen a people like these here?

"Now I won't say that everyone in Grantville is that way. In fact, there are a lot of Americans who wish they were back where they came from, working for little more than subsistence pay because back there they had so many conveniences. Didn't have to work half as hard for them, either. Which is also why most of those people will never leave Grantville if they can help it.

"I'd known of your Herr Jenkins before he left here because I was cutting timber for Herr Chad Jenkins. Frankly, he did not have the best reputation. In fact, he . . . well, never mind. Now I can't help but admire him. Of all the Americans who left Grantville, I think he's about the only one who doesn't work closely with other Americans, only Germans."

"You're German. What makes them different?" Georg asked, as their meals were placed in front of them.

Bernhard shrugged and had a bite of his sandwich before continuing. "It's something inside them, in their education, that they refuse to be defeated by events. You've already heard how long they were educated. Do you realize that in this city less than one child in ten dies of illness? They claim that number is ridiculously high, that in a few years it will be less than one in a hundred. What medicines they can produce keep many children alive but cleanliness is the single largest reason they say. It's nearly an obsession, the insistence on washing their hands before eating and after using the facilities. The sewer you were building in Jena is part of that insistence.

"Next month I will return to my home town to bring my sister and children here. After the Croat attack, I figured if Wallenstein and Richelieu are that afraid of Grantville-educated children, then I'd better get mine here as soon as possible. Can you imagine what an education is worth from the most knowledgeable place in the world?"

"Interesting." Georg bit into his toasted roll. It was sliced lengthwise and contained sauerkraut and sausage that was slathered with mustard. Expensive but not bad, he thought, letting its sharp and spiced flavors fill his mouth. He put it down and tried some pickled cabbage. It was . . . different, definitely not as good as what his mother used to make but then whose was?

"Is this place open for breakfast as well?"

"No. Just keep sniffing when you leave the dormitory tomorrow morning and watch where the other men go. There's a few different places. I live in a house owned by Herr Jenkins with five other men and we have a German woman who cooks for us every morning. Care for another beer?"

* * *

When Brigitta walked down the hallway ringing the bell the next morning Georg woke up with a headache. Not his usual headache caused by drinking too much. His head hurt in different places. He opened his eyes or at least tried to. Something was definitely wrong because he couldn't open them more than slits. What was in that beer last night?

Georg threw back his blanket. He walked stiffly over to his cabinet, got out his clothes and, sitting on the bench, put them on painfully. He hadn't felt this bad since that drunken fight in . . . Checking his pouch before putting on his trousers, he found that he had most of his money. Well, that was good news.

Slowly, painfully he put his head up and walked out. It was cool for being the just past the middle of summer he thought, taking a deep breath. Ouch. That hurt too. He breathed in through his nostrils and . . . cooking sausage. Breakfast!

Georg looked around at the other men coming out of the dormitory. "Hey, where's a good place for breakfast?" he called.

One of them looked at him strangely and then nodded. "This way."

* * *

"What the hell happened to you?" Bernhard asked when Georg walked into the shop almost an hour later.

"I don't know," Georg admitted. "I remember leaving the Gardens. I don't remember much past then. I saw another tavern. I think it was a tavern. I guess it sold food because I remember a sign in English

saying, 'No Krauts'. 'No' meaning 'nichts' and 'Krauts' I figure was for 'cabbage.' They didn't have any cooked cabbage for sale. Stupid sign to put up. I'd already had enough to eat anyway. I opened the door and well, that's the last I remember from last night."

Bernhard sighed. "Kraut is a derogatory term for German. Remember when I told you not to go to the Club 250 yesterday because they don't like Germans? Guess what you did. Somebody, probably a lot of somebody's beat you up. Let me take you over to the restroom. I'll clean you up."

When Georg looked in the mirror, he was shocked. First of all, he'd never seen himself in a decent mirror. Second, it was no wonder he felt bad. Both eyes were swollen almost shut and his face had been brutalized. There were smears of dried blood from his nose on his chin and cheeks where he'd wiped his face last night. Thank heaven he'd been feeling no pain.

"I hope you can see well enough to work," Bernhard said. He washed and rinsed Georg's face until it was cleared of all blood. "We've got a shipment going out on Monday. If we don't get enough finished today, we're going to have to work on it tomorrow."

"Are you all right?" Herr Jenkins asked as soon as he saw Georg.

"I feel hurt but it could have been a lot worse," Georg said bravely. As time went on, he was feeling more aches and bruises in various parts of his body. But he still had all his teeth and he'd given worse in fights. "They weren't really trying hard to injure me. Either that or I defended myself well and my knuckles don't look that bad."

Bernhard brought over two light blue pills with a glass of water. "Here. This will make it hurt less."

"What kind of pills are these?" Georg asked, putting the pills into his mouth and taking a drink of water to wash them down.

"Like an essence of willow bark in pill form. They call it aspirin. It relieves pain. There's a doctor in Jena who compounds it for us."

Fortunately, being the newest member of the assembly crew, Georg's job was the easiest. All he had to do was hammer square-ended metal caps on each end of the cylinders and lightly tap gears with a small hammer onto each cap using a covering piece of wood before passing them to the next position.

* * *

Since Georg was paying for his own meal tonight and wouldn't be paid by Herr Jenkins until noon tomorrow, he only had a sandwich and a beer at the Thuringen Gardens. Well, one more beer. He could afford it and it really was good beer.

By the time he left the Gardens, the sun had been down for hours. He still had enough in his pouch for tomorrow's breakfast.

The streetlights were on, which helped as he stumbled the short distance from the Gardens to the dormitory. It was a warm, beautiful night and Georg was feeling one with the world. He would have sung but in the past people had compared his singing to the braying of a mule and he was determined to be a good boy here in Grantville.

Should have used the facilities in the Gardens before he left, Georg thought as his bladder began to feel

uncomfortable. Probably not a good idea to piss in the streets here. He'd wait until he got to the dormitory.

Umm, the dormitory was just a little far away. *Nobody will notice if I duck into an alley for a few moments.* He was feeling awfully tired . . .

"Hey, you! Yes, you with your*schwantz* hanging out. What do you think you're doing?" the German patrolman asked. Georg was propping up a wall with one arm, the other holding his trousers as he returned the fluid of at least one large mug of beer back to the earth from whence it came.

Georg turned, slumping sideways against the wall without stopping the flow. "Jesus Christ! He's whizzing all over the place," the second of the two patrolmen shouted.

The first patrolman laughed. "I should have let him keep going the way he was. Now he's wet his trousers as well, Jonathan. I thought you would have seen this in the army. Come, we'll take him home. After he pulls up his pants."

"Shouldn't we take him in?" the younger man asked as the two men helped Georg continue walking back in the well-lit street.

"Why? He hasn't done anything wrong except relieve himself in the wrong place. Besides, look at his face. He's had enough trouble already and he's not violent. Putting him in a cell would be a waste of the taxpayers' money."

About that time Georg began to feel sick. Very sick.

* * *

The next morning Georg's head exploded when Brigitta walked down the hall clanging that infernal bell. Wearing only his pants, he stumbled into the bright hallway headed for the showers. At least he knew why his head hurt this morning.

Brigitta was coming towards him from the end of the hall, still ringing the bell. She grinned at Georg's expression as he clamped his palms over his ears. "Herr Bauer! When you take your shower, keep your trousers on." She laughed.

Georg looked down and just as the urine and vomit on them registered in his mind, his pants fell to his knees. Brigitta burst into loud peals of laughter and started ringing the bell again.

* * *

Bernhard looked over at Georg an hour later when he came in to work not looking much better than he had the day before. Only now his trousers were soaked as well. Bernhard just shook his head with a sad smile.

"Georg?" He saw the younger man wince. "We've got enough rollers prepared. Today you'll press and then stencil the name of the company on the slats that will be on both sides of the top of the wringer assembly."

Georg took a piece of paper out of his pouch and handing it to him. "Bernhard, what does this mean? The old man at the front desk gave it to me when I came downstairs this morning."

Bernhard took a quick glance at the police citation. "Drunk and committing a public nuisance. You understand the drunk part. The public nuisance probably means you were pissing somewhere that was not a restroom. Probably in a street or alley. Right?"

"I . . . uh . . . don't remember too well," Georg admitted, his face screwed up trying to remember. "You mean that's a crime in Grantville?"

Bernhard nodded. "Remember what I said about cleanliness? Now you'll have to go to the police station and pay a fine. Probably about ten dollars. That's most of what you've earned your first day. Don't forget you're going to owe for another week at the dormitory before you get paid again."

"What? What am I going to live on? How will I pay for my food?"

Bernhard shrugged. "Perhaps you can get an advance on your pay from Herr Jenkins before that comes due. Come, I'll show you the pressing equipment and how to place the stencil so you can paint it."

* * *

When Bernhard had explained Georg's situation to Herr Jenkins, he looked very unsympathetic. In fact, Chad pulled out a folder with Georg's name on it and inking a quill, wrote down the circumstances.

"I don't like this. I don't like this at all, Georg. I hired you based on my son's recommendation. Now you're letting him down as well as me. Frankly, I'm tempted to let you go right now. But I won't. This time. The next time you get into trouble . . . But I will advance the amount of your fine from your pay for next week before court because I understand your situation and that will be the last time. Understand?" Herr Jenkins asked sternly.

Georg felt he should have been grateful but . . . a fine for just being drunk and taking a leak against an alley wall? It wasn't like he was doing it in the middle of a street in front of a group of schoolchildren. "Yes, Herr Jenkins. It won't happen again."

"Good," the older man said, closing the folder. "Bernhard tells me you did good work today in spite of your problems. As I understand it, both nights you had been drinking. Try ordering water instead until you're almost ready to leave and then have one beer. I guarantee the water won't make you sick. I hope you will be able to improve your skills even more next week. All right?" He rose from behind his desk and walked over to Georg. He put his hand out. Georg took it, giving a quick shake.

Half an hour later, with an unfocused anger and still feeling out of kilter, Georg was walking hurriedly on the sidewalk with his head down. When someone came out of a doorway, they collided and both men went down quickly.

Georg bounced up ready to fight before he saw who knocked him down. A Jew! A filthy, stinking, lousy, Jew! A Christ-killer, one of those who Martin Luther had condemned and who Georg's former pastor had said it would be a blessing to smite! Pastor Keller had devoted considerable time telling to how to identify Jews. Here was this long-bearded man wearing a Jewish prayer shawl, its knotted tassels sticking out from beneath his coat. Georg didn't stop to think. He punched the other man in the stomach just as he was rising to his feet. What right did this man have to be in a Christian town?

Georg was about to kick him in the privates when he suddenly found himself on the ground with one arm twisted behind him. Someone's knee was in the middle of his back.

"Are you all right, Rabbi?" the German policeman asked with concern.

"No. I most definitely am not," the older man said weakly, catching his breath. "This young man hurt me. I suspect he would have done much worse if you had not intervened. I was coming out of the shop and we ran into each other. I guess you saw the rest."

"What's the matter with you?" shouted Georg to the policeman from his viewpoint on the sidewalk. "He's a Jew!"

"Ah, that explains it," the old man said scornfully. "Another who feels that the slaughter of thousands of Jews in Spain and elsewhere is still not enough to make up for the death of a single Jewish carpenter a millennium and a half ago. I would rather he hit me because I inconvenienced him. But what can you do against consummate superstition?"

"I can take him in and charge him with assault and battery against you, Rabbi. That ought to teach him something. All you have to do is sign the charge sheet."

The old man bent down. He looked at Georg's face then sighed. "No, I don't think I will. In fact, I forgive him. Isn't that the Christian thing to do?" he said with a bitter twist of his mouth.

"I don't want your goddamn forgiveness, you stinking Jew!"

"Nevertheless, like God's love, you have it anyway," the rabbi said with an ever so patronizing smile. "Whether you want it or not. Even if you are not one of my people." Then he walked away.

Georg was hauled to his feet only to see Herr Jenkins standing right in front of him. "I don't think you're the type of person I want working for me," Chad said coldly. "Get your bag and get out of town. If I see you again, I'll insist that the police press charges. Have I made myself clear?"

* * *

Halfway back to Jena, Georg came to two conclusions. First, Grantville was different. Second, he never wanted to go there again.

THE WOMAN SHALL NOT WEAR THAT

by Virgina DeMarce

Summer, 1634

No. Pastor Ludwig Kastenmayer put it out of his mind. His eyes must have deluded him. The cleaning woman at Countess Katharina the Heroic Lutheran Elementary School, here on the outskirts of Grantville, could not have been wearing . . . that.

He put it out of his mind until, while walking along the road to Rudolstadt, he observed some others of his female parishioners among a street-sweeping crew, among a gutter-cleaning service, and a window-washing crew. In each case, some of them seemed to be wearing what? He tried his best to pretend that he had seen no such thing.

Until the day that he entered his own home and observed the nether garment that Salome—Salome? his wife Salome?—was wearing as she bent over to clean the hearth.

* * *

He sat in his study and checked the appropriate references contained in Martin Luther's*Table Talk* —comments on whether or not it was worth a pastor's while to preach in regard to female modesty. They brought him no joy. Luther's thesis had been that it was not usually worthwhile to preach on such topics because, as a result of the German climate, one's female parishioners were ordinarily wearing multiple layers of skirts and petticoats that covered them from head to toe, a head scarf or hat, and not uncommonly a cloak, wool socks, lined boots, and mittens, with a hot brick under their feet.

This, the venerable Luther had pointed out, relieved German pastors of worrying about the topic of modesty, which had preoccupied so many of the early church fathers. They, living in a Mediterranean climate, had naturally been more concerned with the impact upon morals and mores of skimpy coverage, flimsy fabric, and revealing that which was better concealed. If a pastor had an affluent parish, an occasional sermon on the topic of luxury in dress might not be amiss, but that applied at least as much to men as it did to women. Usually more. For the average rural village church, even that was scarcely a problem, though.

The German climate had not changed significantly. Most of the time, at least in winter, the up-time women went around dressed in items such as "sweat shirts" which provided full coverage and did very little to emphasize those female attributes which many men found tempting. The garments were, in fact, Pastor Kastenmayer thought, quite literally as ugly as sin. The up-time men wore "sweat shirts" also, but surely only the devil himself, Kastenmayer thought with some humor, could persuade a female to put one on.

In the summer, however . . . Pastor Kastenmayer sighed. Although the up-timers were not his direct concern, their impact upon Grantville's Lutheran women was. It looked like it was going to be "back to patristics" for the themes of some of his sermons this year.

Plus, there was a more serious theological concern.

Only a few of the younger down-time women and almost none of the respectable married women in St. Martin's in the Fields parish had been tempted to try "jeans." Pastor Kastenmayer suspected that more and more of the girls attending the up-time high school wore them on weekdays, when they did not expect to be under his eye. Little Anna Krausin, Maria's sister, came immediately to mind. He occasionally had a depressing feeling that he really should try to do something about that. Although what he could do other than preach a sermon was something of a quandary.

Even Anna Krausin came to church wearing skirts of a respectable length. If not, precisely, of a respectable width, and almost certainly lacking petticoats beneath them. He referred this concern back to the topic of modesty, which appeared earlier in his notes.

If "jeans" were a peripheral matter because they had not made great inroads in his congregation—he added a mental "yet" to this analysis—those . . . things . . . that Salome had been wearing were not.

Upon inquiry, he found that the offending garments were sometimes referred to as "divided skirts" or "culottes" but the most common variant was called "skorts." Apparently these disguised trousers had become widely accepted among his parishioners.

He had refrained from reproaching her directly because . . . Salome, although an excellent wife in most ways, did not always accept reproaches as meekly as theory indicated that she should.

His first wife hadn't, either.

Hardly any wives did.

This was unquestionably one of the more lasting effects of original sin.

Except, of course, that if one read the narratives quite literally, which one certainly should do, Eve had not been inclined to obey either Adam or God Himself even before the Fall of Man. Which was most perplexing, no matter how various theologians attempted to explain it, since supposedly things had been perfect in the Garden of Eden. Did this imply that God regarded a woman with an independent mind as a proper component of paradise? Surely not. But, then . . .

Nevertheless. He pulled his thoughts together and focused them.

It was his clear duty to do something. In the Bible, more precisely in the Old Testament, more precisely at Old Testament, Deuteronomy 22:5, there was to be found the statement, in Luther's German translation:*"Ein weib sol nicht mans gerete tragen/vnd ein man sol nicht weiber kleider an thun/Denn wer solchs thut/der ist dem Herrn deinem Gott ein grewel."*

The English language Bible that Gary Lambert had loaned him agreed. "The woman shall not wear that which pertaineth unto a man, neither shall a man put on a woman's garment: for all that do so are abomination unto the Lord thy God." King James Version.

Anxiously, he checked it in the Greek translation of the*Septuagint* . He followed this by reference to the original Hebrew. Why waste all those years of education in the biblical languages that had been forced down his throat, after all?

His obligation was clear. He must enter the confines of Grantville proper to discover the exact cultural status of skorts and such related items as divided skirts. Did they, or did they not, pertain to a man?

Feeling vaguely morose, he wandered into an otherwise empty classroom at Countess Katharina the Heroic Lutheran Elementary School, next door to the church. Where he observed his daughter, Maria Blandina, teetering on the top of a too-short step stool, trying to tack up a new set of alphabet letters. Experiencing a panicked concern that she was going to fall off, carefully avoiding startling her, he suggested that she come down. She did manage to make her way down safely, surrounded by his anxious admonitions to "find someone taller to do that." In the process, alas, he observed that she was wearing what? Yes. That. Under her full skirt, but wearing it.

Of course, he had to admit, worn as an undergarment that did contribute a great deal to the preservation of appropriate feminine modesty. Far more than petticoats did. Hmmmn.

* * *

"I do feel obliged to do it," the pastor said to Jonas Justinus Muselius and Gary Lambert a few days later. "To determine the status of these 'culottes' and 'skorts.'"

After a few moments of further contemplation he said, "Jeans, on the other hand. They are obviously male clothing."

"Actually," Gary said, "they're sort of both. They come in two kinds. Sometimes girls do wear guys' jeans, but not usually. Not if the girl has a shape. If she does, guys' jeans are, ah, mostly the wrong shape, if you get me." He gestured with his hands. "Since Sheila was left up-time, I gave her clothes to the Ecumenical Emergency Refugee Relief Committee early on, so I can't show you. Unless we could borrow a pair from someone else."

Kastenmayer looked a little daunted by the prospect of a demonstration.

"Maybe Ronella Koch would lend us a pair, if we asked her," Gary continued.

August, 1634

"There you go," Ronella said. She had almost finished mounting Maria Blandina's new alphabet cards. She was only four inches taller than her friend, which didn't make a lot of difference, but had arrived from the trolley carrying the Kochs' eight-rung aluminum stepladder, which did.

She would start her adult career, teaching at Grantville high school, in a couple of days. Mathematics department. Advanced algebra and trigonometry. Her mother's determined tutoring had paid off. Combined, of course, with the incredible turnover that the high school faculty had experienced in the past three years, as experienced teachers were yanked out for other work in government or industry, replaced at first by retirees and teachers called up from the lower levels. Then the retirees, getting no younger themselves, were often unable to maintain the pace of full-time teaching and grading indefinitely.

Up-time, these plum courses would have gone to a teacher with more seniority. Here and now, down-time, Victor Saluzzo, himself the third principal in four years following Ed Piazza's move into government and Len Trout's death, counted himself lucky to get her. Even without anything resembling a teaching certification.

Her mother, Carol Koch, most widely known among down-timers for her role as an up-time delegate to the Rudolstadt Colloquy more than a year before, had steadfastly refused to sell the stepladder for its aluminum content, no matter how many anxious buyers appeared at her doorstep. In fact, after receiving several urgent appeals, she had removed the stepladder from the tool shed in the yard and now kept it under her bed in the house. As she said with perfect logic to a would-be purchaser who was pressing her very strongly, "It doesn't matter how much more money I would have in the bank. If I sell you that, we won't have a tall stepladder that's light enough for Ronella and me to carry around when we need it. And we probably never would again. So there."

"Stick your head in next door, will you, and ask Jonas if he needs anything put up, taken down, or changed around while I have the ladder here?" Ronella started to tack the last few letters to the molding.

"Will do." Maria Blandina ducked out the door.

* * *

In the next classroom, Jonas Justinus Muselius was looking glumly at his friend Gary Lambert. "I don't see why not?" he said. "It would be very suitable."

"I don't want to marry Ronella," Gary answered. "Any more than you wanted to marry Maria Blandina when the pastor asked you. Even aside from the fact that she's ELCA rather than LCMS, I don't want to marry her. I like her, but I just don't see her as wife material. At least not wife material for me. I haven't met anyone I've seen as wife material since Sheila was left up-time." He paused. "There's nothing wrong with Ronella. I'm sure she'd make a perfectly nice wife for someone else," he added charitably.

Jonas looked glum. "She's old enough that she's bound to be getting married pretty soon. We can't expect her to stay unmarried much longer. Somebody needs to make sure that she has a husband who appreciates her and will be kind to her. We ought to find her the right kind of husband. Someone with a sense of humor. Otherwise, since I'm sure that her parents will want it to be someone with a university degree, she'll end up stuck with someone like Johann Georg Hardegg, who never laughs at all. Just because he's a lawyer and suitable."

Gary would never have described himself as an intuitive type. Nevertheless, he looked at Jonas, suspicion dawning.

Jonas was thirty-two. Five years older than Gary. Jonas would never consider himself suitable for Ronella Koch, daughter of a prosperous up-time mining engineer. Not for Ronella, just turned twenty-three and already with a faculty appointment at the prestigious Grantville high school. Not with only one good arm. Not on the salary of a down-time elementary school teacher. Not.

So he was trying for what he considered the next best solution. A suitable husband. One who would make Ronella happy in the long run, even if it left him utterly miserable himself.

Jonas was that kind of person.

Gary was still thinking about this when Maria Blandina stuck her head in the door asking about any possible stepladder needs.

Jonas hated not being able to do things that required two hands. He was also realistic about not being able to do things that required two hands. He had a list of a half dozen little classroom chores that could benefit from the attention of Ronella and a stepladder.

Maria Blandina went back to her own domain. Ronella appeared with the stepladder.

Ronella didn't make concessions to Pastor Kastenmayer's flinch reactions. She was definitely wearing jeans. And a tee shirt. She scurried busily up and down, Gary moving the ladder from place to place for her.

Jonas sat there, watching the passing scenery a little wistfully. He saw no objection to jeans at all. Especially not on Ronella. There was nothing at all about jeans on Ronella that would delude anyone in the world into thinking that they pertained to a man. As an attempt at cross-dressing went, they were a total dud. When she wore them, it was perfectly clear that she was female.

Of course, that was always perfectly clear to Jonas. Meaningfully clear. Crystal clear. Increasingly clear. More transparently clear with every day that passed.

* * *

"Do you suppose," Ronella asked Maria Blandina rather wistfully, "that Jonas is ever going to make a move?"

Maria Blandina's life thus far had left her with few illusions. She had managed to hold onto a few dreams. Illusions, no. Approximately eighty children, first and second graders, day in and day out, did that to a young woman. Although she, like Ronella, was twenty-three, she had been teaching full time for five years already. Part time since she was sixteen.

"Probably not," she answered.

Early in the spring, Ronella had decided, "That one!" after she heard Jonas leading the prayer before the upper grade girls' softball game between Countess Kate, as the Lutheran elementary school was known almost universally among the up-timers, and the middle school in Grantville. He chose the first verse of Psalm 26. In the King James Version, since Countess Kate was playing an English-speaking school.

"Judge me, O LORD; for I have walked in mine integrity: I have trusted also in the LORD; therefore I shall not slide."

"That one!" she had said to herself. "The one with a wicked sense of humor. The one with a*bilingual* wicked sense of humor."

Now she asked, "Is there anything I can do about it?"

"Would your father be willing to propose to him for you?"

Ronella jumped.

"Well, you know," Maria Blandina said in a reasonable tone of voice, "Papa asked him if he would be willing to marry me and he just said no. So we know that he'll say no if he isn't interested. How much worse off would you be if your father asked him and he said no?"

"None, I guess," Ronella admitted. "But at least the way things are I can sort of hope. It would really sort of put the kibosh on everything if he refused."

"But it would be a lot less embarrassing than if you just flat kissed him and he ran away," Maria Blandina pointed out. "Which I sort of suspect you're on the verge of doing any day now. Kissing him, I mean. It gives you a lot more room to save face to have your father do it."

* * *

"Maybe," Salome Piscatora suggested tentatively, "you could make your inquiries to the Interdenominational Ministerial Alliance in Grantville. The association that quite a few of the different pastors belong to. They might have an answer."

Pastor Kastenmayer regarded his wife with scandalized horror.

"They use the same Bible," she pointed out. "Even if it's translated into a different language."

He delivered an abbreviated version of his standard sermon on the hideous consequences of consorting

with heretics.

Salome had heard it all before. Her father had been a pastor, too, and both of her grandfathers had been school teachers.

After long enough exposure, a sensible person got sort of inured to sermons and lectures.

Not that she wasn't fond of Ludwig, of course.

But she had no intention of giving up her divided skirts, culottes they were called, now that she had obtained them. They were such a convenience. She had the tailor cut them full enough and long enough that Ludwig would never even have noticed if he hadn't come in unexpectedly and seen her bending over.

Which just went to show. If they had pertained to a woman well enough before he noticed, it made no sense at all to argue that they didn't after he had noticed.

She would have to talk to Carol Koch about it. Carol was pragmatic and sensible, even for a woman. Much less a man.

Ludwig went off to his study to prepare his next sermon. Salome sat down heavily on the bench under the window in the main room of the parsonage.

Salome knew that she herself was pragmatic and sensible, even for a seventeenth-century German Lutheran pastor's wife, which was saying something.

She hoped that Ludwig would talk to Jonas before he did anything rash. Jonas was the son of her much older half brother. Her mother's first husband had been named Jonas Musch; Muselius was one of those fanciful Latinizations to which academics were prone.

She herself was the next to the youngest child of her mother's second marriage. Another Latinization, this time from Fischer to Piscator. So she was called Piscatora rather than by the sensible German name of Fischerin. She had been four when her mother died in Ohrdruf. That was in the county of Gleichen, which did not exist any more. Her father, for a wonder, had not married again, even though he had small children. His widowed sister, whose second husband died the same year as Mama, brought her own five children from two marriages and came to take care of them all. Tante Margaretha had been a good and conscientious woman. She still was, for that matter. At the age of eighty-one, she lived with her oldest son in Weimar these days.

Papa had become a pastor in Erfurt shortly after Mama died. Not a prestigious pastor in that great city. He had spent all the rest of his life as an auxiliary appointee, caring for parishioners in one of the poorest sections of the city to the best of his ability and maintaining his large household on a small stipend. This meant that aside from schools and books, their lives were in no way more luxurious than those of their neighbors. The schooling had to be reserved for the boys, who needed it to make their way in life. Papa had not died prematurely. He had been seventy-three, but it certainly had not helped that her two older brothers, Reichard and Thomas, had both died unmarried, just a couple of years before he did. He had not lived to see his youngest son marry so well, to the daughter of a Wittenberg professor no less, and begin to make a great success of himself.

She had no learning but what Papa had time to teach her after fourth grade. He didn't have the money to send her to a city school for girls. No accomplishments suitable to a fine young lady other than how to play the lute, which he played himself. He had taught her and her older sister Anna what he knew himself.

Latin and a little Greek. The ancient classics. Theology. Dull things, not likely to attract suitors. Otherwise, she worked in the house, helping Tante Margaretha. The four years after Anna married and moved back to Ohrdruf, she had worked very hard. Five grown men in the house to be clothed and fed, with Tante Margaretha so sad those first years after her only daughter died.

The letter from Anna had come as an absolute shock. Their pastor had been widowed, she wrote, with five small children to care for. He needed to remarry as soon as possible. She had suggested her Salome and the pastor had said, "If you think she is suitable, which you must, then ask your father." Papa had considered it an excellent opportunity to place her in a household of her own. He had been afraid that Tante Margaretha would keep her home too long and she was not likely to have many chances. So at the age of twenty, she had traveled to Ohrdruf to Anna. Three weeks later, as soon as the banns had been read, she married a man she had never met before she got there. Ludwig was almost twenty-five years older than she was, three months a widower. A widower who had loved his first wife deeply.

Overall, it was just as well that she hadn't expected more out of marriage than she got. In fact, she got more than she had expected. Kindness, absolute reliability, and no expectations that she should achieve more in the way of food and domestic comfort than was possible within the limitations of a pastor's salary. And, over the years, eight sons. By the will of divine providence, seven of them still alive and still to be educated. Joseph, the oldest, was nineteen, in his second year at the university in Jena. The youngest, Thomas, only three.

Plus, they were to be blessed again. In October, if all went well. Two more months to go. She was forty-one years old now. In the heat of this summer, she occasionally had a little trouble persuading herself that the creator was entirely reasonable in the way he distributed his blessings. She could not help but think that here were many childless women in the world who would have welcomed this particular blessing a lot more than she did. Ludwig was sixty-five and could not be expected to live forever. At some point, probably not too far distant, she was going to be a widow with no income and a large family of sons to finish bringing up.

And precious little help, probably, from her stepchildren. Matthaeus was a junior pastor now; Martin an assistant city clerk. Self-supporting, but in no position to assist anyone else. Johann Conrad still at Jena, soon to be a lawyer, which also meant several years before he had any significant income. Maria Blandina, dowryless, teaching for no salary at the school here.

And Andrea. Andrea, the selfish little snip who in April had clouded Ludwig's life by showing so little gratitude for a lifetime of paternal care that she eloped with a Roman Catholic up-timer, a representative of the anti-Christ on earth.

Salome knew that in this matter, at least, she was a failure and would be judged for it before God when the time came to separate the sheep from the goats. In spite of all her efforts, she had not managed to imbue her stepdaughters with sufficient common sense and pragmatism. Maria Blandina more than Andrea, but neither of them fully.

They were both, especially Andrea, very much like their mother, from all she had been able to learn. So there was probably little she could do about it. Ludwig was inclined to indulge them because they were so like Blandina Selfisch had been.

And she had been sitting long enough. She pulled herself up and went into the kitchen to see what the girl was doing. Thecla wasn't much of a servant. But she was fourteen and an orphan. By the time Salome was finished training her, she would be a competent housewife in a few years time. Competent enough, it was to be hoped, that some sensible man would overlook her lack of family and funds when he came to

pick a wife. Or, if not, fitted to earn her living as housekeeper to a prosperous family.

Somehow, their servants were always like that.

* * *

"If Papa thinks that he absolutely must," Maria Blandina said to Jonas, "then I guess that he absolutely must go walking into Grantville interviewing men as to whether or not these various up-time garments pertain to men. Though I have a terrible feeling that he's going to get himself into trouble."

"How does he intend to do it?" Jonas asked, looking at his step-cousin. Now that her father had formally sounded him out about the possibility of a marriage between them and he had politely declined the honor, they had reverted to their normal ease with one another.

Maria Blandina had been terrifically relieved that Jonas wasn't willing to marry her. As far as she was concerned, it would have been sort of—well, like marrying one of her brothers. In age, Jonas was right between Matthaeus and Martin and he had been in and out of the house ever since Papa married his aunt when he was eleven and she was two. She knew Jonas awfully well. Although she would have made the best of it if that had been her fate. She didn't expect to duplicate her older sister Andrea's dramatic elopement with an up-timer, but if she ever did find a husband . . . She paused and sent up a silent prayer. "Dear Father in heaven, if you ever give me a husband, I would like to have one who is a little different, if you don't mind. Someone I haven't known almost since the day I was born. That would be very nice, all by itself."

She hadn't known the up-timer Gary Lambert since the day she was born, so she had thought about him occasionally. The thought, though, was that she didn't want to marry him, either. She might as well have known him since the day she was born. There must have been a lot of what Jonas now called "cultural continuity" among the German Lutherans who moved to America in that other world. Gary was very much like her brothers. A recognizable type. Even aside from the fact that he wasn't interested in marrying her any more than Jonas was. She sighed. Who would be?

"Papa can't very well carry a huge suitcase with him as he walks around town. Not at his age. So I borrowed things from Walpurga Hercher. Things that came into MaidenFresh Laundries. Just temporarily, of course. She found a child-size version of each of the various styles for him to take with him on his researches. As examples." She opened the box on her desk to display her trophies.

Jonas looked at the contents and shook his head. There was a divided skirt that would be knee-length on a small child, something called 'capri pants,' and jeans. The culottes were lavender, the capri pants were yellow and white checked gingham printed with daisies, and the jeans were embroidered. But the *piece de resistance* was an up-time shorts/overskirt combination, the style which the pastor so nervously thought of as "That." Maria Blandina called it a skort. Both pieces were sewed to the same waistband, buttoning on the left side. In a floral print of white, lavender, light blue, and a darker pink, with dainty green vines tying the individual blossoms together. With a pale pink background. Trimmed with pink rickrack on the pockets and around the hems of both the shorts and skirt. And pink plastic buttons molded to match one of the kinds of flowers in the print.

Poor Papa, Maria Blandina thought as she handed the box over to her father the next morning. With a certain amount of malice aforethought, she admitted to herself a little guiltily. However, as Jonas said, he would have to learn sometime.

Magdeburg, August, 1634

Mary Simpson's normal school committee got everything organized and sent off to Duke Ernst in the Upper Palatinate. It would open in the Jesuit*Collegium* in Amberg in September and start training elementary school teachers for the villages of the USE.

They had managed to get it all done on time. Except for one crucial thing.

The new institution still did not have a permanent administrator.

For the moment, Duke Ernst's personal secretary would add it to his workload. That was obviously not a feasible solution for the long term.

September, 1634

"You know," Walpurga Hercher said, "the pastor could get into a lot of trouble doing this. Especially if he went into some of the rougher places, like the 250 Club." She looked at her sister Lisbet consideringly. "I think we ought to get the boyfriend collection to steer him a bit. You and Jonas can ask Errol just to sort of fall in walking with him the morning he sets out, can't you? When Errol is finished playing for the children's music class at the school in the morning. Make sure that he doesn't go to the wrong spots."

"What do you call this?" Lisbet asked suspiciously.

"Reasonable prudence," Walpurga answered. "Pastor Kastenmayer isn't such a bad sort. Maybe Errol could take him to the Freedom Arches to talk to Derek Blount and those guys. If he wants to ask young guys. If he wants to talk to up-time women about it, he could go to Cora's. Ryan could take him there, since Magdalena works in the kitchen."

"I don't see why he couldn't just talk to Errol and the others out at St. Martin's," Lisbet said. "After all, they come to church with us now."

"The pastor's a man," Walpurga answered. "That would be far too simple a solution to the puzzle."

* * *

"You want me to what?" Ron Koch asked in horror.

"I just told you," Ronella answered.

"But."

"Look, Dad," Ronella said. "I want to marry him. We're at a standstill. You don't have anything against him, do you?"

"Well, no. But it's just . . . err,*primitive* . . . for me to arrange a marriage for you. Or try to." Ron had, after all, proposed to his beloved Carol on the basis of ten minutes' acquaintance. This project was distinctly alien to every one of his sensibilities.

"Please, Daddy," Ronella said. "Pretty please, with sugar on it." She clasped her hands, rested her chin on them, and batted her eyelashes.

That was not fighting fair. She knew it and so did her father.

"Jonas is a fine young man," Carol Koch said. "I got to know him pretty well during the Rudolstadt Colloquy and I really like him."

They both looked at her.

"If you won't ask him for her," Carol said, "I will. It's not as if he's going to find anyone nicer than Ronella."

Both of the elder Kochs looked at their daughter with considerable parental satisfaction and pride, pleased with their achievement and mutually agreed that no one would ever find a girl nicer than Ronella.

Ron Koch groaned. Outmaneuvered again. He wasn't good at talking to people. Not persuasive. He knew that. He preferred to let the facts speak for themselves when he made a presentation. He hadn't been trying to persuade Carol of anything when he proposed as soon as he saw her. The fact that they absolutely would never be happy again unless they got married to each other as soon as it could be achieved had been perfectly plain to both of them.

It was hard to think of any facts that he could lay out in such a manner as to demonstrate that Jonas would be the best of all possible husbands for Ronella. For himself, the facts that she wanted the guy and Carol approved of him were enough.

Lots of young couples started out on a shoestring. He and Carol would be content with that for Ronella.

He had a suspicion that down-timers didn't look at it that way. He'd have to ask one of them how a father was supposed to go about this.

Maybe he could ask Pastor Kastenmayer, he thought.

Pastor Kastenmayer subsequently confirmed that Jonas was not the product of a world that believed in trying to live on love.

* * *

Pastor Kastenmayer transferred the examples that Maria Blandina had collected for him from the box into a small satchel with a handle and set forth on his journey of exploration.

Errol Mercer joined him before he had even gotten out of the courtyard that lay between the church and the school, mentally shaking his head about the stuff that a guy would do when Lisbet asked him to.

He set out to do a little steering. Luckily, walking into town from St. Martin's, a person passed the Freedom Arches before getting to the downtown part itself.

The pastor politely greeted Derek Blount, who was eating his breakfast. Ursel Krause kept peeking from behind the counter, trying to see what was going on.

"Morning, Pastor Kastenmayer," Derek said. "Meet my brother Donnie."

He hadn't prepped Donnie. But he was, after all, Donnie's brother. The two of them had lived in the same house all their lives. He knew him pretty well. He had complete confidence in Donnie. At least as far as solving this little problem went.

Kastenmayer smiled. Derek's brother. An up-timer who was not scheduled to become one of the grooms for the girls of Quittelsdorf. Thus, an impartial witness.

He explained his mission.

He reached into his satchel.

He came out with the pink floral print skort.

"Would I wear that?" Donnie jerked back in spontaneous horror. "Hell, no. What do you think I am?" he asked. "Some kind of girly man?"

Although, in the interest of thoroughness, Pastor Kastenmayer pursued his inquiries for the remainder of the morning, through such venues—preselected by Walpurga—as the office of the "home economics" teacher at the middle school and Karen Reading's bridal shop, he knew that he had his answer. He returned home with a considerable feeling of relief. This was certainly going to simplify life.

After all, the pertinent passage in Deuteronomy did not say a word describing the prohibited garments. It did not state that they were any variety of trousers or indicate what they looked like. It merely forbade "that which pertaineth unto a man."

Grantville, October, 1634

"Okay," Gary Lambert said. "I'll come to Jena with you all and tell them what I know about the whole 'spouse left up-time' marriage thing. They need to come to some kind of a final resolution. Roland Worley seems a nice enough guy, so we ought to clear the decks if he wants to marry Rahel Dornheimer. I can kill two birds with one stone. Beulah McDonald has been nagging me to come and meet some of the faculty members there outside just the school of medicine. Dean Gerhard is planning a dinner party. I'll have her invite Pastor Kastenmayer and you, too, Jonas. Since you're going to be there anyway."

* * *

"Daddy," Ronella Koch said. "Do you mean to tell me that you haven't said a word to Jonas*yet* ?"

Ron Koch looked miserably uncomfortable. "Honey," he said. "Uh. That is. Don't you think that if Jonas wanted to marry you, he would do something about it himself?"

"To be perfectly honest, no. I think that left to himself he'll be noble and self sacrificing until the end of time."

"I really don't want to do this."

Ronella knew that already.

"Please, Daddy. Please. Maybe you could say something to Pastor Kastenmayer and then he could say something to Jonas?"

That was a little ray of sunshine. Thin, watery, and wavering. But at least not his own personal rain cloud following him around.

Ronella looked at him. If Daddy hadn't done something by Christmas . . . Well, she would think of something. Right now, she had papers to grade. Stacks and stacks of papers to grade. Oodles and gobs and mountains of papers to grade. One of the few things that could be said for the first year of teaching was that it sure took your mind off your other troubles.

Jena, October, 1634

Johann Gerhard, dean of the faculty of theology at the university of Jena, looked at his dinner party.

Overall, he was satisfied. Basically, the handling of the case of Roland Worley's up-time marriage in the briefs submitted by expert advisers from both law and theology schools throughout much of Lutheran Germany indicated that a spouse left behind in such a way should be considered deceased. Without requiring an extended waiting period or an individual decree in each case. The Saxe-Weimar consistorial court had ruled accordingly this morning, concurring with that of Schwarzburg-Rudolstadt.

This meant that in addition to the now basically Philippist consistory in Schwarzburg-Rudolstadt, they had a ruling from the basically Flacian consistory in Saxe-Weimar. Flacian Lutherans basically thought that Philippists were suspiciously lax with tendencies toward crypto-Calvinism. Philippist Lutherans frequently thought that Flacians tended to be uptight, overly orthodox, ultrarigid pains. They rarely agreed on any point of doctrine.

Gerhard was orthodox himself, of course. Though suspected of pietist sentimentalism by even stricter Flacians. All of the Jena faculty was Flacian.

That the two consistories agreed on the marriage issue was a relief, since the alternative would have been the need for the party now in the seventeenth century to apply for divorce on the grounds of abandonment and that would have proven impossible. Abandonment, as everyone knew, had to be willful. It would be impossible to interpret the parting of spouses caused by the Ring of Fire as having been deliberate on the part of either one. That would have been a dilemma. A serious dilemma when it came to finding a wife for Gary Lambert. Now . . . he had representatives of both contending schools of Lutheran thought at the same dinner party. Which might possibly turn out to be touchy.

Gerhard's wife Maria smiled at him from across the room. She was talking with Beulah McDonald. Since her father had been a well known physician in Coburg, the two had common interests. Standing with them were Catharina Barthin, the wife of Friedrich Hortleder, and her daughter. The Hortleders had come from Weimar specifically to attend this dinner.

Ludwig Kastenmayer was talking to Hortleder himself, introducing Gary Lambert.

Hortleder as a historian was delighted to be meeting another up-timer.

Hortleder as a lawyer was as happy as Gerhard to have one more issue surrounding the up-timers pretty

well settled. A settlement to which his own brief had contributed as much as Kastenmayer's tact.

Hortleder as a bureaucrat, the former tutor of the young dukes of Saxe-Weimar and the chancellor of the duchy at the time the Ring of Fire occurred, always felt a need to be very cautious around the up-timers. It had been, after all, on his watch that Grantville "slid" Saxe-Weimar out of the grasp of its rightful rulers while they were away fighting on behalf of the emperor Gustavus Adolphus. Logically, since the dukes appeared to bear the up-timers no major grudge, they should bear Hortleder no major grudge, either. But human beings were not always logical, so Hortleder remained careful, even though the nature of his position as chancellor, which he still held, required him to work closely with the up-timers.

Hortleder had been a bit startled when he first discovered that Herr Michael Stearns was, if anything, a Calvinist, while Herr Edward Piazza was a Catholic. But he had borne up well, under the circumstances. He had also provided them with the loan of many young, well-trained administrators and bureaucrats—a commodity of which they were acutely in need.

When humans were being logical, Gerhard thought, Hortleder was the kind of man who logically ought to appeal to the up-timers. Not a nobleman. Not even close. He came from very modest circumstances. His father had been a farmer and local administrator at Ampfurth bei Wanzleben. He had studied law at Helmstedt, then at the universities, Wittenberg and Jena, as a scholarship student and gotten his doctorate in 1606. He spent some time as a private tutor. Two years later he had become tutor to the young dukes of Saxe-Weimar. Wilhelm Wettin, as he was now, Bernhard, Ernst, Friedrich, and the others so sadly deceased. A year later, he received an additional post as lecturer at the university of Jena. In 1617, they appointed him court historian, in recognition of the publication of his history of the League of Schmalkalden. And, as so often was the fate of scholars, moved him into administration. He became a member of the ducal council and was placed in charge of the duchy's archives.

Catharina, his wife, was the daughter of the chancellor of Brandenburg's Neumark. They had married while he was still a student, which was most unusual. It was even more unusual that Chancellor Barth had permitted it. There had certainly been no guarantee back then that Hortleder would have an outstanding career.

The joy and sorrow of their life was their daughter Anna Catharina. Joy because now, at twenty, she was a lovely girl. Sorrow because she was their only child.

Gerhard's gaze continued around the room. Zacharias Prüschenk von Lindenhofen had accompanied the Hortleders. He had come to the university of Jena four years ago to get his law degree. He now wanted to marry Anna Catharina. More precisely, he wanted to marry the only child of the chancellor of Saxe-Weimar, who happened to be Anna Catharina. Gerhard feared that in Prüschenk's view, she could just as well have been anyone else.

From Sulzbach in the Upper Palatinate, von Lindenhofen was twenty-four and ambitious. The Ring of Fire had destroyed his prospects of an advantageous betrothal to Gertrud Romanus, the daughter of the mayor of Naumburg, when the political constellations changed. Although he was of the lower nobility, or at least claimed to be, he was now willing to condescend to marry the only daughter of the commoner who was chancellor of Saxe-Weimar for the connections she would bring him.

Prüschenk was . . . Gerhard looked around . . . over there, talking to young Muselius, his back turned to Kastenmayer, Hortleder, and Lambert.

That was good, because Beulah McDonald was clearly about to introduce Hortleder's wife and daughter to Gary Lambert, whose role at the Rudolstadt Colloquy made him of such piquant interest to

many of Thuringia's Lutherans. Gary was a wonderfully orthodox Lutheran, Gerhard thought with satisfaction. The up-time LCMS to which he belonged was nearly equivalent to being a Flacian. Whereas the ELCA to which families such as that of Herr Ronaldus Koch and his wife belonged was essentially Philippist. Gerhard found it comforting to discover that the eternal verities had continued so far into the future.

Though a little startling that Gary continued to be personal friends with the Kochs and Muselius—even with Kastenmayer—in spite of their theological differences.

Gary clearly piqued Anna Catharina Hortleder's interest a great deal. She seemed to be in no way disillusioned by the reality of the slightly stocky build, prematurely receding hairline, and thick spectacles of the first real up-timer she had ever met.

Gerhard sighed. He and Maria had hoped to find some nice, suitable girl in whom Gary might take an interest once his matrimonial status was cleared up.

But not that one.

Friedrich Hortleder was looking at his daughter and Gary with one of those "What the hell have I done?" expressions on his face.

It was too late to change the list of guests Maria had invited to dinner and back Chancellor Hortleder and his family out of the room.

Prüschenk would not be pleased to have a second prospective fiancée slip out of his grasp.

* * *

Pastor Kastenmayer had not wanted to stay in Jena to attend this dinner. He would have preferred to return home at noon, as soon as the court had issued its ruling. Salome was very near her time. He didn't care for the idea of leaving her alone with the children longer than absolutely necessary. However, since he was here, he would do his duty. His telling of the story of his adventures among the up-timers in pursuit of enlightenment in regard to Deuteronomy 22:5 was the hit of the evening.

Zacharias Prüschenk von Lindenhofen did not find it funny.

He was also dissatisfied with the matrimonial ruling that had been issued that morning. After all, no matter what had been concluded by the consistory of Saxe-Weimar, on the basis of the majority of the expert opinions it had gathered, it had failed to take into consideration advice from the saner portion of German Lutheranism. The more prestigious university of Wittenberg, in Electoral Saxony, under the patronage of Duke John George, had not yet ruled in the matter of presumption of death for spouses left up-time. Nor had the Saxon consistory. In Prüschenk's view, the Jena faculty and Saxe-Weimar had acted prematurely.

Prüschenk frowned at Anna Catharina Hortleder, making his disapproval of her obvious interest in the up-timer Lambert clear. She ignored him.

Perhaps it was not too late to change his allegiance. If he could obtain an appointment in Saxony, then the possibility of his marrying Gertrud Romanus from Naumburg might be revived. She wasn't betrothed yet.

He could probably start by writing a pamphlet denouncing Kastenmayer's methodology and conclusions in regard to Deuteronomy 22:5. A pamphlet with woodcuts. Citation to legal precedents. Something involving heresy and the whore of Babylon as well as skorts and culottes. Prüschenk's mind drifted as the guests moved into the dining room.

Weimar, October, 1634

Gary Lambert was finding a lot of reasons to go back and forth to Weimar these days.

The staff at Leahy Medical Center extended its indulgence to its business manager. Beulah had clued them in. There was a general consensus that if anyone deserved a few rays of sunshine in his existence, it was Gary.

So he was talking to Friedrich Hortleder. And his wife. And his daughter. About the problems of his friend Jonas, whom Hortleder had met at Dean Gerhard's dinner.

"So, I thought," he said a little hesitantly. "They haven't hired anyone for the job yet. It's the kind of thing he would be really good at. It would pay enough that he could marry Ronella. And since you were their tutor, maybe Duke Ernst would pay attention to a letter of recommendation from you?"

Hortleder considered.

"I believe," he said, "that I should know more of the situation before writing Duke Ernst. Not that I doubt your assessment of the situation. But, perhaps, I should come to Grantville for a week or two. Observe Muselius for myself, beyond what one can learn at a dinner party. Meet the young woman and her family. Talk to Pastor Kastenmayer in more detail."

He looked briefly at his wife and daughter. "Bring my family with me, so that I may also benefit from their assessments."

Anna Catharina jumped up, yelled "Papa" at the top of her lungs, and hugged him.

Hortleder continued to speak with undisturbed solemnity. "In the meantime, I will write Duke Ernst only to the effect that I have identified a suitable candidate for the position of administrator of the new normal school and beg him to make no other appointment until he hears from me again. In fact, I will request you to send a radio message to him from me. A message to that effect."

Grantville, October, 1634

Salome Piscatora was extremely indignant at the pamphlet that arrived in the mail. It came out of Saxony. It portrayed her in a set of divided skirts in a style she had certainly never worn.

Never would have worn.

Abominable thing. Salacious.

The pamphlet said awful things about Ludwig, who had gone to Rudolstadt today to meet with the

consistorial court. Things going all the way back to before he had transferred from Saxony to Ohrdruf in Gleichen. Long before he had come to Schwarzburg-Rudolstadt. Whoever wrote it must have connections in Saxony.

Then it said things which accused him of misinterpreting the scriptures in regard to Deuteronomy 22:5.

She looked at it, sputtering.

Stood up. Sat down. Realized that the baby was coming.

St. Martin's in the Fields parsonage had not yet been equipped with a telephone.

Jonas had one installed in the school, though.

Carefully, she crossed the courtyard to the school.

"It's not right," she said to Maria Blandina. "I've had enough children to know. It isn't coming right. There's something wrong."

Jonas called for an ambulance and put the older children on the honor system until he returned.

The pastor's wife had expected to be delivered at home by a midwife, of course. But it was clear that there would not be time.

It was also clear, Jonas thought, that there was nothing an ordinary midwife would be able to do to help her.

* * *

"So you see," Ludwig Kastenmayer said to Friedrich Hortleder, "I was wrong. I refused to pay for a 'telephone' with parish funds. I thought it was a frivolity. We had lived without one for all of our lives, so why should we need one now?

"Jonas paid for it himself. For emergencies, he said. Without it, I would have lost both Salome and the child. Three physicians were called to assist. One revived the child. 'Resuscitation' they call it. The other two performed surgery.

"I don't know what I would do without Salome. I have come to rely on her so much, in every way. We are naming the baby 'Jonas Justinus,' of course. I will hate to lose him if the up-timers find him a different job. He is a wonderful teacher."

Hortleder nodded. He sent a follow-up letter of recommendation to Duke Ernst that evening. One considerably warmer than the first, which he had mailed as a courtesy to Gary.

* * *

Ronella Koch stood on her toes, trying to peek over Gary's shoulder into the hospital nursery.

Gary didn't move out of the way. If he had moved, Ronella would have had no reason to grab onto Jonas' good arm to help her stay balanced on her toes. There were all sorts of ways to be a friend.

She got a good look at the baby. Her fingers tightened on Jonas' arm, so hard that he flinched and stepped forward even with Gary, bringing her with him. She sank back down on her heels, looking at Gary.

"Yeah," he said. "We revived him, of course. That's what we do with babies who can live. Whether they'll thank us for it in the long run is another question. But that's what we do."

Maria Blandina, standing on the other side of Jonas, was frowning. "Papa has baptized other such infants," she said. "They do not often live long. That is in the hands of God. At least my stepmother did not die. Papa would have missed her very much."

The Hortleders had let Anna Catharina come with Gary to see the baby and then go to a student concert at the high school on condition that the two of them remained with Jonas, Ronella, and Maria Blandina. Carol Koch had bribed Herr Hortleder the historian to permit this excursion with the promise of an exclusive interview concerning her perspective on the Rudolstadt Colloquy.

Anna Catharina was frowning in turn. "What is wrong?" she asked Gary.

The group adjourned to one of Leahy's many cubicles to discuss Down's Syndrome.

* * *

Jonas thought that he ought to excuse himself from the remainder of the evening in order to be available to assist Pastor Kastenmayer and his wife if he was needed. At least, that was what he said. In fact, he found proximity to Ronella increasingly uncomfortable.

"You can't," Gary said firmly. "You can't just duck out on the rest of the evening, because having you here was one reason the Hortleders let Anna Catharina come with us." He managed to make it Jonas' duty to remain. Jonas had a strong sense of duty. Unfortunately, the only way Gary could think of to persuade him that he had a duty to marry Ronella—wouldn't work. Not given his conscientious avoidance of proximity.

Jonas was going to be as proximate to Ronella as Gary and Maria Blandina could maneuver him all evening. No having Ronella on one end, the other three of them in the center, and Jonas on the far end. Which he would try to manage if nobody watched him carefully.

"Conspirators 'R' Us," Gary had said to Anna Catharina. Then he had to explain the context. It had taken quite a while, but neither of them minded. She said that she was quite willing to help with the maneuvers.

Grantville, November, 1634

Ron Koch was feeling acutely uncomfortable.

Not that Pastor Kastenmayer didn't understand the problem.

"What Jonas needs, if this is to occur," Ludwig Kastenmayer said, "is a better job. Not that I wouldn't hate to lose him at the school here. He is an excellent teacher. But the fact is, he is in no position to support your daughter. He's perfectly right about that. He would have been an acceptable match for

Maria Blandina, since she is used to being just as poor as he is. But . . ."

"I was afraid of something of the sort."

"He left his studies at Jena after two years to take the job teaching at Quittelsdorf because he was out of money. If he should return to the university now, it would be at least five years before he would be in a position to marry," Pastor Kastenmayer continued. "Even if he received a plum job offer immediately upon completing his degree. There is no family to provide him with a subsidy. Consider the proverb 'poor as church mice' and apply it to his case."

"Should we factor in that Ronella would be perfectly willing to wait?" Ron asked. "Not happy, but willing. She has a bad case of wanting to marry Jonas and no other."

Pastor Kastenmayer fingered his goatee.

"The other possibility might be for Grantville or the State of Thuringia-Franconia to hire him in some sort of an administrative capacity. Someone such as Herr Adducci. Or, perhaps, Herr Chehab in the Department of the Interior. Many of your leaders do not have university degrees. Jonas is very capable. He would make an excellent chief of staff or personal assistant. He would be a loss to our school, of course. A great loss. He is an excellent teacher. A truly outstanding teacher. And because of his friendship with Gary Lambert, he has learned more about working with you up-timers, perhaps, than anyone else among us."

"What the USE doesn't need right now," Ron Koch said, "is to lose any more of its good teachers."

* * *

"Daddy," Ronella asked. "Have you talked to Jonas?"

"Ah," Ron Koch said. "Well, I've talked to Pastor Kastenmayer. We're trying another tactic. Trying to find Jonas a job that pays more. I'll talk to the SoTF personnel office to see what they have for openings. Your mother is going to talk to Count Ludwig Guenther about a scholarship so he can finish his degree and get a job that pays more later on. If he has that, maybe he'll, ah, take care of the rest of the project himself."

"You really don't want to talk to him about it for me, do you?"

"Honestly," her father said. "Not one little bit."

"If you don't do*something* pretty soon . . ." she wailed. "Daddy, you're just going to have to adapt."

"What still bothers me," Carol said afterwards, "is that we don't really know whether or not he wants to marry her. Noble renunciation doesn't usually last this long. Maybe he's just not interested."

"According to Gary, he's interested," Ron said.

"Well, that's a relief."

"It's a relief, but it doesn't seem to simplify matters any. The general consensus among the sensible and pragmatic members of down-time society seems to be that he can't even afford to court her, much less marry her."

* * *

Friedrich Hortleder was finding more reasons to travel to Grantville to consult with other members of the administration of the State of Thuringia-Franconia these days. Frequently, he brought his family.

"I'll show you the outside of the 'trailer' where Gary lives," Pastor Kastenmayer said to him. "I've gotten to know quite a few of the people who live in this 'trailer court' now. More and more of the 'units' are occupied by Germans. It is not by any means a fine house, but what more does a bachelor need? I feel sure that he is in a position to afford better now, should he chose to marry again."

"I," Hortleder's wife said, "would much appreciate seeing this 'small electric organ' that he is said to own. Can you arrange for me to view it? I have trouble visualizing the concept."

They were not surprised when Gary invited them to dinner.

They were very surprised that he cooked it.

"I've gotten better at it," he said cheerfully. "When you have to eat your own cooking, you either get better at it or get indigestion. I eat at the hospital cafeteria sometimes, especially breakfast. Or pick up some carry-out, if I'm in a hurry. But most of the time, I cook."

After dinner, Gary and Hortleder dived into the contents of Gary's grandfather's footlocker. Where Hortleder discovered many things of interest.

"You're welcome to come and look again any time," Gary said. "I'm glad I've found someone who really appreciates the stuff. Now if you look at this . . ." He picked up a red book. "It's the*Concordance to the Lutheran Hymnal* . It doesn't just have the words in both the original language and the English translation, but also short biographies of the composers and lyricists."

Hortleder thumbed through. Biographies of composers now well known. And . . . those of boys now young children. Giving, frequently, their birth places and the names of their parents. Boys whose careers could be furthered, whose development could be enhanced by scholarships or appointments to cathedral choirs . . . Through the patronage of the dukes of Saxe-Weimar . . . Who could thus continue to be of great importance in the duchy that the up-timers had slid out from under them on his own watch, while they were away.

"Could I borrow this?" he asked.

"Sure," Gary said. "I hardly ever use it. It's not the kind of thing the state library has any need for, either."

Amberg, Upper Palatinate, December, 1634

"Because it appeals to my sense of humor," Duke Ernst said to his secretary. "A Christmas present for him."

"One for me, too, Your Grace," Johann Heinrich Boecler said. "Doing another full-time job has not been fun. When?"

"After the end of the school year, I'm afraid. In the spring."

"Better than never. What does Mrs. Simpson think of the decision?"

"She doesn't know him, but she doesn't object. Moreover, since I'm paying his salary, it is my decision."

Duke Ernst had a firm grasp on the reality of patronage. Namely that the person who controlled the purse strings controlled the project, no matter how courteously.

"I will employ this Muselius and I will notify him by radio. Making sure that the full package of paperwork is there in advance, of course."

Jena, December, 1634

Dean Gerhard and his wife invited Gary Lambert to Jena for Christmas. Gary accepted. It provided him with a graceful excuse to avoid the issue of taking communion at St. Martin's in the fields. Pastor Kastenmayer was, basically, of the Philippist persuasion.

It would also be nice that the Hortleders were permitting Anna Catharina to visit the Gerhards over the holidays.

Very nice, really.

Grantville, December, 1634

"Why now?" Jonas asked wearily. The last thing that he needed on the late afternoon of Christmas Eve, the day when he would need to direct the children's play in the evening, was a summons to the Department of International Affairs to receive a radio message. "Can't someone just transcribe it and send it out here?"

Maria Blandina's eighty, more or less, first and second graders were singing loudly. Not melodically, but loudly.

Errol Mercer had introduced some new melodies for them. Jonas had written more theologically suitable lyrics. "A host of heaven'ly angels" now stood in for "Rudolph the red-nosed reindeer." Combined with the traditional "Vom Himmel hoch da komm' ich her" every child would get to sing a solo line.

That was important to the parents of the littlest ones.

For the older children, of course, the program was more ambitious. A pageant for the third and fourth graders. They were setting that up in the courtyard. It was very convenient for a director that heavenly angels appeared in hosts. It gave a person something to do with the children whose voices did not carry well outdoors.

Then his own upper grades.

He was grateful that Ronella had offered to help with the program.

He really was.

It was kind of her. Especially on top of her own heavy teaching obligations. He kept assuring himself that she was doing this out of kindness.

If it only hadn't caused her to be right here in his classroom so much of the time after school for the past two weeks. So visibly, physically, present.

Right here and right now, she was waving the telephone receiver at him. "You can come and talk to them yourself. They want you there when the 'radio window' opens up."

He stood up. "I'll go."

"Catch the trolley both ways," she said. "It's faster. That's an idea. I'll get Daddy to add some money into our special Christmas contribution to cover trolley fares for the Countess Kate staff when they need to go downtown or to Rudolstadt. I'll run the kids through one more rehearsal for you."

Jonas winced. Special contribution. Casually add enough money to cover a year of carfares for the staff. One more reminder of how far she was beyond his reach.

But he took the trolley.

"God damn and blast," Ronella muttered under her breath. She couldn't seem to spend an hour with Jonas without saying something that rolled back against her.

* * *

Jonas looked disbelievingly at the radio message as it came in from Amberg.

It had to be a joke.

But it wasn't. The final line was a statement that the paperwork was in Herr Jenkins' office and he should pick it up before he returned to the school. Reply requested within one week.

He went into Wes Jenkins' office. Consular Affairs. The packet was there.

He put it in his apartment when he got back to the school and turned his attention to last minute rehearsals.

Maria Blandina and the ladies of the congregation were feeding the children supper here. It just took too long for them to go home from rehearsals and return again for the evening. St. Martin's in the Fields parish covered too large a geographical area for comfort. Not like a village church nestled snugly in the middle of the houses, or a town church drawing parishioners from one district of the city or one suburb outside the walls.

Adapting, always adapting.

If he left, who would do his work here?

If he left, he would miss the friends he had made since the day he brought the remains of Quittelsdorf

among these strangers.

If he left, he wouldn't have to be here when Ronella married someone else. As she must do, some day.

At Chancellor Hortleder's personal recommendation to Duke Ernst. But how come?

Gary. Yes, Gary, of course. If he left, he would miss the friends he had made here.

A normal school. To administer a normal school, to shape it in accordance with his vision of up-timers and down-timers working together.

He had done these programs so often. He moved through it as though he were aware of what he was doing.

Then the midnight service.

Finally, back in his own rooms, he lit a candle and opened the packet to find out what the exact terms of employment would be.

* * *

Ron Koch said good-night to Pastor Kastenmayer and his wife. He looked around. Carol was standing behind him, a determined gleam in her eye.

"That way," she said. "Those are Jonas' rooms, at the back of the courtyard. The apartment with a candle lit. This is your very last chance, my dearest darling. Either you go talk to him or I do. You have all your talking points in your pocket if you need them. We've talked to Count Ludwig Guenther. There's a scholarship for Jonas if he wants to take it. Ronella would like to know if there's any light at the end of the tunnel. If there is, she's willing to wait. If not—well, then, not. You know. Just go do it."

Feeling remarkably like a lamb led to the slaughter, Ron went off to perform his paternal duty.

Pastor Kastenmayer headed for the parsonage, muttering under his breath about the fact that an up-time girl named Denise Beasley, who had come to the service—she called it a "play"—with Gerry Stone who was now studying in Rudolstadt with the intent of becoming a Lutheran pastor, had been wearing jeans at the Christmas Eve service. Her best jeans. With a coat over them. But still, jeans.

He was beginning to suspect that the more up-timers became Lutheran, the more women wearing jeans there would be in his parish. Theology was one thing. Trousers on women might be adiaphoral, but he would still prefer to see women wearing skirts. Even divided ones.

Carol wiped the slush and snow off the church steps with an old piece of paper and sat down. The stone was cold, but this was likely to take a while.

What was an old newspaper doing here on the church steps? She looked at it, as well as she could, in the light reflecting off the snow. Not a newspaper. It was another of those horrid pamphlets about Deuteronomy 22:5.

Looking more carefully, it was a new horrid pamphlet about Deuteronomy 22:5. There were stacks of them at each end of the church steps, waiting to be picked up by parishioners coming out of Christmas Eve services and coming in for Christmas morning services. Merry Christmas from Santa Claus. Who in

hell in Saxony would care enough about St. Martin's in the Fields to keep them coming? And why? One more irritant out of Saxony. Why did the Saxons care?

The stone was really cold. She grabbed a stack of the pamphlets and sat on them. Someone might as well get some good from the things, even though she realized that she might end up with printers' ink on the back of her skirt, which would be a real pain to get out.

"Carol," Salome said softly behind her. "What is the matter? Don't you want to go inside? Ronella went in with Maria Blandina to stay warm until you are ready to leave."

Carol looked around. Salome was cuddling baby Jonas in a blanket and trying to lock the church doors at the same time.

"I thought you went back to the parsonage with Pastor Kastenmayer."

Salome shook her head. "I wanted to show little Jonas the manger once more. Before I took him home. I'm so glad he lived to see Christmas. I don't think he will live much longer. Each time we take him to the hospital with breathing problems, he comes home weaker. But now, by the faith his baptism worked in him, he knows that he will get to go to heaven and play with the baby Jesus there."

Carol hopped up off the steps, took the huge key, and turned it, using both hands. "How does that work, since Jesus grew up and was crucified?"

"Oh," Salome said. "Eternity isn't time that goes on forever. It is a place without time, where everything*is* all at once. Everyone knows that. It's the main reason that purgatory was such a stupid idea, theologically. You can't have souls doing penance for certain amounts of time in eternity."

Carol blinked.

"'He the alpha and omega, he the source, the ending, he.' It would be nice if the baby could see Easter, but at least he has seen Christmas. Now," Salome said briskly. What's the matter. Why were you sitting on the steps?"

"Nothing's the matter. I'm just waiting for Ron. Who is, I hope, telling Jonas that Ronella wants to marry him. Or something of the sort. If we're lucky, he'll manage to get the idea across."

"Well, then," Salome said practically, "it's just as well that they have found Jonas this new job. Chancellor Hortleder told Ludwig that he would receive the formal offer today. He would never have been able to afford her, teaching here."

"What new job?" Carol asked.

Live Free

by Karen Bergstrahl

Tom Musgrove peered carefully around the door. This close to midnight few of the staff should be

around. Down at the end of the hallway he could hear moaning. "That's the way, Stan, get the nurses' attention," Tom muttered under his breath before he remembered that Stan Zaleski had been dead a year or so. Whoever had Stan's old room was making enough of a fuss to bring the head nurse galloping by. Tom stood still, or as still as an eighty-three year old man with arthritis and pneumonia could. The nurse never noticed him at his door; she was gesturing to a pair of aides coming from the side hallway. When the trio disappeared into the far room Tom waited. He wanted their full attention on the patient in that room and not on him.

Cautiously Tom stuck first one cane out and then the other and dragging his reluctant legs after them. "Can't fall now. Got too far to go." He murmured curses at his creaky old joints. A cough bubbled up and he leaned against the wall until it was finished wringing him out. Damned pneumonia. The "old man's friend" it was called when he was a kid. Eased a man out of life when he was too old and too weak to do useful work. Then antibiotics and all the other medicines came along, letting a man outlive his usefulness without half trying. Well, the Ring of Fire had changed that. Pneumonia was back along with a bunch of other diseases from Musgrove's childhood.

Dying, he thought, as he made his way one shambling step after another, wasn't hard. He'd never wanted to lie on a bed with tubes sprouting like weeds from every part of his body, his mouth hanging open, and his eyes staring at the ceiling. His father had lain that way for six months until the doctors couldn't find a vein strong enough to run another IV and the old man was allowed to die. It had cost the old man his dignity, his savings, and his house. Tom's mother lasted another five years before it was her turn to go. She'd come back to Grantville where her doctor knew her well enough not to stick her full of tubes. She'd passed on in possession of her wits and with her grandkids around her.

Nope, dying wasn't the problem. It was what you had to go through to die that bothered him. At least back here in this Year of Our Lord 1635 the doctors had a harder time keeping you from checking out quickly. A man had a chance to die with his dignity still intact.

The door at the end of the hall was open and he could see through it to the front entrance. A single lamp dimly lit the area. To Tom's relief the little red light over the front door was out. He'd heard from one of the cleaning crew that the alarm system was broken. It was that tossed off comment that made him think that his plan might work. With the alarm system down no loud siren would go off when the front door was opened at night.

The sofa and overstuffed chairs beckoned him, seducing him with thoughts of easing his aching bones in the depths of their cushions. "Sit down now and I'm never getting up," he hissed, surprised by how attractive the idea of scrapping his plan in return for a comfortable chair was. Grimly he clomped, right cane, left cane, right foot, left foot, over to the front door. Bracing against the left cane he pushed the door open. No siren. No sound, just crisp fresh air.

The cold air brought another coughing spell, this one short but painful. Tom looked back along the hallway, afraid the cold air might alert some staff member. He wasn't worried about the coughing—half the patients in the nursing home coughed long and loud throughout the night. One more thing he hated about the nursing home. He hadn't had a good night's sleep since coming here.

He tottered through the open door, painfully turning to gently close it behind him. Free at last! Now, should he take the ramp or the steps? Better the ramp. He'd fallen on the steps at Christmas and his hip still ached. Now that he was outside he didn't have to worry so much about noise and the farther he got along the driveway the less chance there was of some busybody seeing him.

Turning, he eased on down the ramp, pausing at the bottom to catch his breath and to cough again. This

time it was deep coughs, the kind that wracked his whole body. By clutching the handrail Tom kept standing. When the coughing ended he slowly and painfully finished inching off the ramp.

Finally his feet were on the blacktop of the drive. The only light came faintly up the street from a gas lamp at the corner. It was, he decided, a curse and a blessing. No one in the nursing home would be able to see him on the driveway but he wasn't able to see any stones or potholes in his path. Firmly on the plus side was that he was on the driveway and there was no sign of any pursuit.

Forty-five minutes and several coughing sessions later he stood on another blacktop driveway. This one was down the block and across the street from the nursing home. At one end was a garage that had been converted into a two-horse stable. Actually the old two-story garage had been converted back to a stable. It pre-dated cars and had still held horses and a buggy when he was a kid. Funny how things in town had gotten twisted and turned inside out by the Ring of Fire. Or, in the case of this garage, returned to their beginnings.

Inside the reconverted garage one of the horses snuffled and snorted softly at the scent of a stranger outside. Tom automatically made a soft shushing sound and the horse quieted down. Another problem he didn't need was having the horses' owners wake up. He eyed the big door and the smaller one to the side. The smaller one would have to do—he didn't think he could get the big one open.

Once inside the stable Tom leaned against a stack of hay bales. A couple of more coughs shook him and he was grateful for the solid support. Taking the chance that no one in the house was awake he felt along the wall for a light switch. He found it on the right side; two steps in from the door. Blinking in the brightness of a forty-watt bulb Tom looked around. Two equine heads looked back at him. To his left was a big bay with the small ears, wide brow, and small muzzle of a Quarterhorse giving him a quizzical look. On the right a little white mare nickered softly in recognition. Tom smiled, leaned his right cane on the hay and rubbed the mare's face.

"Hello, my little China Doll. I've been watching you for months—since they first brought you here. Old girl, I'm so glad you're still being well taken care of." The window of his room overlooked this barn and he'd been surprised to see this old friend grazing in the small pasture next to the barn. He'd watched in pride as she calmly carried a pair of children off to school. A jealous pang hit him when he saw the boy getting her to bow and shake hands. She had learned those tricks—and several more—from him years before.

Small, white, part Welsh pony, part who knows what, China Doll had been one of three ponies he'd purchased so the grandkids would have something to ride. Finding her smart and willing, Tom had taught her tricks and begun riding her to keep her in shape. He'd sold off the other two ponies when the kids had grown too big and found other things to do with their time, but he'd kept China Doll for himself. When the weather was good, the pair would ride up past the cemetery to the ridge above. If it was rainy or snowing, Tom spent time brushing China until her white hide gleamed.

Mary Jane had often teased him that he cared more for "that damned pony" than for her. Then the day had come when Mary Jane was diagnosed with cancer in her pancreas. Everything changed overnight.

"Old girl," Tom explained as he stroked the little mare. "I took Mary Jane up to the hospital in Pittsburgh. Didn't have time to think about anything or anyone else. We thought we'd be there for five or six months. That's how come Harry sold you off—he thought it would be too much trouble for me to keep you. Then Mary Jane was gone inside of three weeks." Tom shook his head. "At least death came fast for Mary Jane. When I brought her back you were gone. Harry told me he'd sold you to a kid in Fairmont."

The bay gelding, jealous of the attention to his stable mate, started kicking his stall door. Tom found grain in a metal trash can and scooped some out and into the bay's feedbox. A couple of flakes of hay followed. "That should keep you busy, fella," Tom grumbled affectionately. "Now, I've got to get on to business."

Two saddles rested on sawhorses and Tom smiled to see that one was his old saddle for China. "Well, girl, Lady Luck is running my way tonight." He slid the bolt back and tugged at the stall door. Whoever had rebuilt the stalls had done a good job. The big stall door glided easily along its tracks. China Doll stepped daintily out of the stall and stopped beside him, whiffling quietly, sniffing him, finally snorting at some smell clinging to his clothes.

Tom threw his arm across her back and cued her to walk forward. She hesitated for a moment and then moved slowly, a single carefully placed step at a time. He'd taught her this trick when the arthritis had gotten bad in his knees and ankles. Patiently she supported him and helped him shuffle to the saddles.

"Good girl, smart girl, wonderful girl. You haven't forgotten anything, have you, Doll?" Tom whispered. The pony flicked one ear back to listen and gave another soft snort. Tom laughed and stroked her neck. "That's my Doll! Whoa, girl. Let me think about what I've got to do next."

Shifting his weight back to his cane, Tom reached down and unbuckled her blanket. With a grin he gave her another cue and laughed as she grabbed the edge of the blanket and pulled it off her back. A gleam in her eyes showed that she not only remembered this trick but also was enjoying performing it for him. He cued her again and the pony dropped the blanket into a heap in front of her.

Tom ran his free hand over China Doll's back and sides. Not only did her winter coat gleam but it was free of dirt and old sweat. That wasn't easy to accomplish with a white horse. "Somebody's been taking good care of you, Doll. Real good care. I've worried about that." Tears trickled down Tom's cheeks as he leaned on Doll, stroking her neck and straightening her mane. "Thought so, from what I could see out that damned little window but it's good to know for certain. I'm borrowing your four good legs, girl. Just for a little while. You'll be home in time to take your kids to school."

Getting the saddle blanket on one-handed wasn't hard. Nor was making sure that it was on just right, no wrinkles or bunching. The saddle was a different matter. Tom leaned against Doll's side studying the matter. Finally he laid his canes across the other saddle and took hold of Doll's saddle with both hands. A surge of strength came to him from someplace and he was able to pivot and place the saddle gently on Doll's back. While the strength flowed he flipped the cinch off the horn and started to bend down. Warning pains in his back flared. In exasperation he muttered a curse and reached for one of his canes. Reversing the cane, he used the handle to hook the dangling cinch and pull it up. Once the cinch ring was in his hands it was a matter of seconds to thread the latigo through the ring. His hands worked quickly and confidently and the cinch was tight.

"Now let's see, Doll. Are you holding out on me? Do you still take a deep breath when you're cinched up? Tina didn't think it was so funny when she ended up under you that time. See, girl. I'm not so young any more. I need your help." China Doll turned her head and blew her warm breath across his face. She nodded her head and grunted and the cinch suddenly hung loose. Tom stroked her face, rubbing behind the ears just the way the white mare loved. Wise to the ways of even the smartest and most generous of ponies, Tom rapidly pulled the cinch tight and neatly tucked the latigo end into its keeper.

"Now, girl, we have a couple of problems. I've got you out of here and get onto your back. We're going to walk out the small door, Doll. You can do it, I've been watching you. The boy can't get the big door

open, either. He takes you out the small one all the time. Mind, Doll, there isn't any need to snort and carry on with me. I know what a smart girl you are and I know you aren't afraid of that door. Not my China Doll." While he was talking to the mare Tom retrieved his other cane and hooked it over the saddle horn.

With his arm across the saddle, man and pony crossed the stable floor to stand in front of the smaller door. Hanging up on hooks by the door were two bridles. Doll stopped, turning her head toward Tom. He chuckled, coughed, and slowly stepped in front of her. Taking hold of a bit of her mane behind her ears he opened the door and eased out. The mare followed him quietly. Outside she drew a deep breath, sampling the night scents.

From somewhere down the block a dog barked halfheartedly. Tom looked around, checking to see if anyone responded. Up the block the lights of the nursing home shone steadily. Best of all, there was nothing to indicate anyone there knew one of the inmates had escaped.

"Okay, girl. Let's see if I can get my old carcass into the saddle one more time." With only a couple of unsteady moves Tom managed to scramble into the saddle. Once there a sense of peace came over him. The mare stood still and rock steady, only her breathing indicating she wasn't a statue. Tom sat still, feeling the warmth of China Doll under him, enjoying her strength, and wondering again at the willingness of horses to carry people. A faint gray on the horizon told him it was later, far later, than he'd thought.

Looking down, Tom realized he had dropped his canes. "No matter. I don't need them when I've got you, Doll." With a slight squeeze of his legs he set China Doll walking out and up the street. Together in companionable silence, the pair clopped up the streets and through the sleeping town. China Doll seemed to know where Tom wanted to go; any cues he was giving her were unconscious. Up they went, up old familiar trails they hadn't been along for years.

Finally, at the cemetery gate China Doll hesitated. She turned her head back as if to ask where Tom wanted to go. "Yes, girl. Clever, clever Doll. This time we go in. Mary Jane's here, waiting. The rest of the family is, too, girl. Grandpa Sam would have loved you, Doll. He's the one who taught me about horses. He's waiting here. So's my little sister, Lizzie. She loved horses and ponies. Always had an apple or sugar cube in her pocket. She would have loved to pet you and feed you pieces of her apple. The diphtheria got her, Doll, when little Elizabeth was just ten. Here we are, Doll. That's Mary Jane's place there and here, next to her is my place."

Tom sat looking over the gravestones marking his relatives' graves. Some were old and badly worn, the lettering hard to make out. Others were still clear. Clearest and sharpest of all was Mary Jane Stull Musgrove. The sky was light enough to read the markers if Tom had needed to. He knew these graves, knew which belonged to Grandpa Samuel Edward Musgrove, to his great aunt Edna Catherine Musgrove, and that the little one under the tree was marked "Elizabeth Edna Musgrove." All his relatives were gathered here in this little corner of a West Virginia graveyard.

Tom knew where every grave was and who was buried in it. He knew what relation they were to him and he knew their stories. He knew which relatives were missing. Uncle Vern and Great Uncle Ed had been killed in WWI and buried in France. Cousins Bobby Joe and Johnny were also buried in France, killed in the Normandy Invasion. His older brother Steve wasn't there, either. He had been shot down somewhere in the Pacific. Farther back there were a couple of others that hadn't come back from Cuba, or the Philippines. Several graves were missing for those who had died in the Civil War.

China Doll shifted under Tom and her movement brought him out of his thoughts. "Sorry, girl. Didn't mean to keep you waiting around in the cold like this." Groaning, Tom managed to dismount without

falling. He patted the mare on her neck, enjoying her warmth and the feel of her muscles under the white hide. "Time for you to go, Doll. You'll have to hustle to be back in time for school." He pushed her head away and slapped her on the shoulder. "Go on, Doll. Get!"

The mare trotted off a few steps and stopped. She turned around and eyed him questioningly. "Go, Doll. You got me here, that's all you have to do." Tom wheezed. His lungs rasped wetly and he began to cough. Stepping back he leaned against his grandfather's gravestone. "Go home, Doll. I've done what I meant to," he managed to get out before more coughs claimed his attention.

China Doll paced slowly forward until she stood beside Tom. She stood patiently by his side until the coughs subsided. "Go home, Doll. It's cold out here. Your breakfast is back in your nice warm barn," Tom protested to the silent pony. "Oh, Doll. Your part is done. You've helped me escape that God-awful place with its people poking and prodding me. They won't leave a man alone there. Won't let him die in peace and dignity. Hell, Doll, They put diapers on me 'cause I move too slow to get to the pot." He wheezed a bit and continued his plea to the mare. "I've always lived free. Figure I should be able to die free, too. Let 'em keep what little real medicines they have for the young folk who still have lives to live."

Tom took hold of China Doll's saddle and pulled himself beside her. Clutching the cantle he managed to move his feet until he was standing next to his wife's grave. Using the stirrup leathers he lowered himself down until he was seated next to Mary Jane. A feeling of peace eased his heart and he found himself able to cross his legs without pain. A chuckle escaped him. "We beat 'em, Doll. We beat 'em."

* * *

By the time the sun rose fully the police found both the missing nursing home resident and the stolen pony. As the cruiser turned in the gateway the white mare lifted her head and nickered. The man seated on the ground didn't move.

"How the heck do you figure he managed this?" The older cop mused. "I mean, from the description we got, old man Musgrove was too sick and crippled up to get out of bed. He must have had a powerful reason. "

"Man, it's cold out here," commented the younger cop. "Call it in. With any luck the funeral home will send somebody quick. I don't want to stand around all day. Graveyards always give me the creeps."

The Dalai Lama's Electric Buddha

by Victor Klimov

"Respectful greetings from His Majesty Gegen Setsen Khan to Your Holiness, Kundün," said the emissary. It was not really warm in the library, but the atmosphere felt warm and friendly. "Let me present you this surprise from the Western lands."

Dalai Lama V Ngawang Lobsang Gyatso, who—in another universe—would later be called "The Great Fifth," respectfully put his hands together to greet the image of the Victorious One. The little statue looked unusual. It was made from material like ivory but was obviously much lighter and it was pink in

color. The Victorious One was meditating.

"If I press this knob . . ."

The image lit up with a steady internal light. It looked a little bit like a colored lantern, but the light was not flickering. The emissary pressed the knob again and the light disappeared.

"Thank His Majesty Gegen Setsen Khan and thank you, Dr. Luvsan," said Dalai Lama and accepted the holy image. Ngawang Lobsang was fascinated. The statue was light, but not so light as it looked. The weight seemed concentrated in the base under the lotus seat. The texture of the surface felt smooth, somewhat like smooth wood but not quite.

Dalai Lama pressed the knob. The statue lit up. He looked at the emissary, lifting an eyebrow. "What causes this?"

"Kundün, as far as we know there seems to be a kind of prana energy concentrated in the base of the statue. . . ."

"Ah. That's why it feels heavy there."

"Probably, Kundün. And the trader it was bought from warned that the prana in the statue should somehow be replenished after a while. But it seemed he did not know how. He said that if it were used sparingly it should last a couple of years."

Dalai Lama switched the light off. He looked at the statue, then at the emissary. "What do your yogis say?"

"They feel the prana but they are not sure whether they succeeded in replenishing it."

"Very well." The Dalai Lama nodded slowly. "We'll try here, too. But tell me please the history of the statue. How did His Majesty acquire it? You said it came from the West?"

The emissary nodded. "Yes, Kundün. The Khan of Dörvn Öörd [Kalmyk]

sent it to His Majesty. The Khan bought it from a trader from Phe-rang [Europe] for one hundred horses. The trader said that the holy statue miraculously appeared in the center of a great circular Mandala, which also contained a whole town."

Dr. Luvsan moved his hand in a graceful gesture in the direction of hundreds of volumes wrapped in brocades and silks. "Naturally, the trader did not know the relevant terminology. What I'm telling now is what the Khan's advisers were able to get out of the trader. He didn't see himself the holy mandala. He only heard about it from the person who sold him the relic. His description of the town in the mandala corresponds somewhat with descriptions in the Kalachakra tantra.

"It appears very probable that the town came from another dimension. The trader was very sure that nobody has ever seen anything like this before. And the people of the town appear to be mighty warriors. The trader was sure about that. And they also ride iron horses. I don't know if one could believe that."

"Hmm . . ." The Dalai Lama stared into space for some time. "Why would a Shambhala town manifest in Phe-rang? Well . . . One never knows. The compassion of the Victorious One is infinite. We must investigate this story. We must find out whether there was indeed a mandala manifestation. And also we

should find out how to replenish the light producing prana." Dalai Lama smiled.

"Yes, Kundün."

Afterword:

Kundün: an honorific referring specifically to the Dalai Lama.

Prana: in yoga, the breath seen as one of the life-giving energies or forces of the universe.

Dörvn Öörd—"The Allied Four" also referred to as Oyirad or Kalmyk people. They were the dominant group from Turkey to the Gobi Desert from the 13th through to the eighteenth century.

A mandala graphically depicts a landscape of the Buddha land or the enlightened vision of a Buddha. Mandalas are commonly used by Hindu and Buddhist monks as an aid to meditation.

Kalachakra is a term used in tantric Buddhism that means "time-wheel" or "time-cycles." The Kalachakra tradition, which is described in the Kalachakra Tantra (which is a book, a collection of Buddhist writings), revolves around the concept of time and cycles: from the cycles of the planets, to the cycles of our breath and the practice of controlling the most subtle energies within one's body on the path to enlightenment. The Kalachakra deity represents a Buddha and thus omniscience. Everything is under the influence of time, he is time and therefore knows all. Similarly, the wheel is beginningless and endless.

A kalachakra mandala is pictured at

http://www.exoticindiaart.com/product/TF75/

In Tibetan Buddhist tradition, Shambhala (or Shambala) is a mystical kingdom hidden somewhere beyond the snow peaks of the Himalayas. It is mentioned in various ancient texts including the Kalachakra and the ancient texts of the Zhang Zhung culture which pre-dated Tibetan Buddhism in western Tibet. The Bon scriptures speak of a closely-related land called Olmolungring.

The Kalachakra indicates that when the world declines into war and greed, and all is lost, a King of Shambhala will emerge from the secret city with a huge army to conquer evil and herald the Golden Age. Some suggest this king may be Kalki, a similar figure.

The myths of Shambala were part of the inspiration for the tale of Shangri-La told in the popular book *Lost Horizon* , and thus some people even refer to Shambala improperly as if it were a Shangri-La. Shambala's location and nature remains a subject of much dispute, and several traditions have arisen as to where it is, or will be, including those that emphasize it as a nonphysical realm that one can approach only through the mind.

CONTINUING SERIALS

The Doctor Gribbleflotz

Chronicles, Part 1:
Calling Dr. Phil

by Kerryn Offord

Sunday. After Church Lunch, Drahuta Property

Deep in the middle of "Kubiak Country" the extended Kubiak clan had gathered at the home of Belle and Ivan Drahuta for Sunday lunch. Grown men and women were messing about playing touch football in the yard with some of the children. Others congregated around the grill chatting and talking while Ivan and Tommy Barancek attended to burning lunch. Children of all ages were running around underfoot. On the sheltered veranda a group of women lounged comfortably, watching the activities, relaxing after finally getting their assorted babies settled.

Erin Zaleski, one of Ted's cousins, grinned. "How's the military outfitting business going. Tracy?"

Tracy Kubiak dragged her eyes from her husband Ted, who was playing in the yard. "We're still being run off our feet." Tracy looked around the assembled women. They were all, like Ted, direct descendants of Jan and Mary Kubiak, the original owners of the land known locally as "Kubiak Country." "I've got a pile of jackets that need buttonholing if anybody wants a job."

There was a smattering of "I'm in" and "Yes, please" from the other four women. Tracy gloried in the easy camaraderie and supportive nature of the Kubiak women. So different from her own family left up-time in way-off Seattle. "If you come over the road after lunch I'll show you what needs to be done and give you the necessary thread and buttons."

There were murmurings of agreement before the women turned back to watching the activities going on in the yard. Their quiet contemplations were disturbed only when Tasha Kubiak settled a covered tray of steaming biscuits on the table. "Tuck in while they're still warm, girls. After this batch, there are no more."

Mary Rose Onofrio turned away from watching Jana Barancek and a couple of other cousins calling everybody to a couple of food-laden tables set out by the grill. "What do you mean, Tasha?"

"This batch used the last of my baking powder." Tasha replied.

Belle Drahuta waved a hand. "I've still got some if you need it."

"Same here. I haven't had time for much baking lately. I think I've still got an unopened can in the pantry."

"Thanks Belle, Tracy. You'd think there would be a way to get more baking powder wouldn't you?" Tasha shook her head.

Mary Rose snorted. "Get real, Tasha. If it doesn't go boom, none of the guys are interested. I can just imagine going up to Cousin Greg and asking him to please make some baking powder so we can do some baking. He'd laugh his head off."

"You really think Cousin Greg would know how to make baking powder, Mary Rose?" Tasha asked.

"If he can make his boom toys and rockets I don't see why he can't make baking powder. I mean. It can't be that hard. Baking powder has been around I don't know how long. It's probably written up in one of his books somewhere and all he needs to do is look it up."

"But, Mary Rose, that doesn't get us any baking powder."

"No, but it would get us some instructions on how to make it. Maybe Cousin Greg can write out a recipe. Something easy to follow. Then we could make our own baking powder." Mary Rose looked around the table at the other women, an excited look in her eyes. "That would be great wouldn't it? No need to worry about running out of baking powder ever again."

"So when can you ask Cousin Greg for an easy to follow recipe for making baking powder?" asked Belle.

Mary Rose looked from Belle to Tasha. "I was kinda thinking, maybe Tasha might like to ask Amy to ask Cousin Greg. After all, she is a chemistry teacher in training."

Nodding her head, her mouth full of biscuit, Tasha agreed to ask her daughter to pass on the request.

"Michael. How many times have I told you not to feed that dog from your plate." Belle bellowed before launching herself from her chair and making her way to her son.

The ladies watched Belle put a strong restraining hand on her five-year-old son while giving her husband, who should have been watching him, a sharp talking to.

"Situation normal," muttered Erin with a giggle.

* * *

A week later. Sunday lunch, Tasha's place

"Guys, Amy here has come through. Come on, Amy. Show them the recipe," Tasha said pushing her daughter towards the seated mothers. A little self-consciously Amy placed a single sheet of paper on the coffee table in front of the ladies and stood back to let them read it.

"Uh, yuk. Do you see that?" Mary Rose pointed to the first instruction. "Imagine carefully fermenting urine. Does that mean we have to, you know, ask people to fill a bottle? And why add honey? Is that to sweeten it to taste?"

"Ha ha, Mary Rose. Obviously the honey is there to help fermentation," Tasha said, continuing to run her eye down the directions. "How do you cook off limestone?" She looked up at her daughter, a question in her eyes.

With a heavy sigh Amy looked at her mother and her friends. "I think this is going to be a bit like the time Dad tried to do some baking. You remember how he couldn't understand how you got cream from butter and sugar?" Smiling at the memory Tasha nodded her head. "I think you might want to find someone who knows a little chemistry and see if they'll make the stuff for you."

"But we know somebody who knows something about chemistry," Tasha pointed out, giving her daughter a significant look.

In horror Amy took a sudden step back, getting some separation between her and her mother. "No way. Sorry, but no way. I'm much too busy at school." She held her hands out defensively and shook her head. "Really. I think you should find yourselves a friendly alchemist and pay them to make the stuff."

"And how are we going to find one of them?" asked Mary Rose.

"Well, Jena is a university town. There must be tons of them there."

"So you think we should go knocking on doors in Jena asking alchemists 'Please sir, can you make baking powder for us?'"

"Baking soda. If you'll read the recipe again you'll see it's for making baking soda, not powder," Tracy pointed out, her finger pointing to the top of the sheet.

"Amy?" Tasha turned to her daughter. "I thought you were going to ask about making baking powder?"

"I did, Mom. I asked Mrs. Penzey. She said you have to make baking soda before you can have baking powder. If you look near the bottom," she pointed to the bottom of the recipe, "you'll see she has included how to make baking powder. The problem is getting the cream of tartar. It's a by-product of wine making, and she's never seen it in its raw state. She's not sure how to get any. And that's another reason why I think you should contact an alchemist. They know about things like cream of tartar, except they probably call it something different."

Mary Rose looked at Amy. "What you're saying is, we can get baking soda easily, but if we want baking powder, that's going to take a little experimentation?"

Amy nodded. "Yes."

"That's not so bad," Belle said. "We can make biscuits using baking soda. I'm sure we all have some recipes that'll work. Besides, there are tons of uses for baking soda. There's toothpaste substitute for a start. And soon enough we should be able to get baking powder." Amy slipped away while the ladies sat silently digesting their thoughts. "Tracy, are you planning on a buying trip to Jena anytime soon?" asked Tasha.

"Ted and I were planning on going down river in another week or so. I guess we can ask around. We should see if Danielle and Steve can go as well. It's a pity we don't have more people able to speak German. The more people searching the faster things will go." Turning to Belle, Tracy continued, "Will you be able to look after Danielle and Steve's two little monsters if they go?"

"Sure. They aren't that bad, and they are closer in age to Louis and Michael than your mob. It'll keep all of them out of my hair if they can entertain each other. What about Richelle? Do you want me to keep a friendly eye on her?"

"Please. I've already arranged for a couple of the machinists to live in while we're away, but she'll feel more secure knowing you're just across the road."

* * *

Jena, ten days later

Tracy looked across the table to Danielle and Steve Kowach. "It's as if they don't want our money. As soon as I say I want someone to make baking powder for cooking they get all uptight and condescending. Their holier than you 'I am an Alchemist, not a cook' line is really getting to me. Have you two had any better luck?"

Danielle shook her head and looked at her husband, who shook his head in negation. "We've been getting the same story. 'Alchemists are not cooks. Please go away and stop bothering me. My work is important.'" She mimicked the condescending attitude that Tracy had become familiar with so accurately that Tracy started to giggle.

"Here comes Ted. I wonder if he's had any luck. Ted, you make any progress?" Steve asked as Tracy's husband took a seat.

"Well, I've ordered a heap of canvas. A few hundred yards of cord of varying diameter, and some oils for waterproof—ouch!" Ted grabbed Tracy's hands to stop her pummelling him.

"Edward Robert Justinian Kubiak, you know that's not what Steve meant." Tracy said, struggling to pull her hands from Ted's grip.

"Has anybody ever told you you're beautiful when you're riled?" Ted asked, a smile in his eyes. They both fell silent as their eyes locked.

"Hey, you two. None of that in public. So Ted, have you found us an alchemist?"

Ted broke eye contact with Tracy and turned to Danielle. "First thing I learnt is, we don't want an alchemist."

"What?" Danielle and Tracy asked in unison. "Of course we do," Danielle continued. Tracy nodded in agreement.

"That's where you're wrong. No." Ted held up his hands to silence their protests. "No alchemist will lower themselves to do what you are asking. What you need . . ." he paused dramatically, "is a technician. Some suitably trained plodder who can follow directions without making any spontaneous additions just to see what happens."

"And how do we find this suitably trained plodder?" Tracy asked.

Ted theatrically drew a piece of paper from a pocket. "By pure chance I have here the directions to one Phillip Theophrastus Gribbleflotz, late of the school at Fugger. Apparently he lacks the proper scholastic and academic attitude to be an alchemist, but in some quarters he is a highly regarded technician."

"What's the significance of the school at Fugger?" Seeing Ted's blank look Danielle hurried on. "Never mind. He has to be better than those supercilious morons from the university."

"I wouldn't bet on that, Danielle. Apparently he styles himself as Herr Doctor Phillip Theophrastus Gribbleflotz. His clientele humor him. He's good at what he does, and it's a fairly harmless conceit. But it does mean you might have trouble getting him to make your baking soda."

"Will money talk?" asked Tracy.

"Ah, the Evil West Coast businesswoman strikes. Yep. My informant indicates that the good Dr. Phil

has a massive ego, only eclipsed by his vanity. His major expenses are his continuing experiments and fancy clothes. Currently he is 'between jobs,' and the quarter's rent on his laboratory is due shortly. The perfect mark for what you want."

Tracy smirked back at her husband, and rubbed her hands together in anticipation. If he was desperate, then he couldn't afford to knock them back. He would probably offer token resistance as a matter of pride, but to Tracy's mind, they already had him in the palms of their hands. It was always better to negotiate from a position of strength.

* * *

Jena, later that same day

"Let me see if I understand, Frau. You wish me, Herr Doctor Phillip Theophrastus Gribbleflotz, Great Grandson of the Great Paracelsus, to make this 'baking powder.'" At Tracy's nod, he continued. "I. I am not a cook. I, do not follow a recipe. I, am an Alchemist. A Great Alchemist. A Great Alchemist does not make funny white powder so people can bake biscuits." It came out stilted, growing in volume as he spoke, until he was almost roaring.

It was a strategic cough from Ted that drew Phillip's fire from Tracy. The six-foot, two hundred plus pound frame of Ted towered above Phillip's thin, short frame. With his pronounced Adam's apple bobbing, Phillip swallowed his words and turned his attention back to Tracy.

"But you could make the powder if you wanted to couldn't you, Herr Doctor?"

Phillip flashed his eyes over the recipe again, then looked back at Tracy. "Of course. Any marginally competent student of alchemy could easily make this 'baking soda.' The 'baking powder' . . . a little time in the laboratory, and that too can be made."

"Well, can you at least help us find someone to make it?"

"I am not a procurer. If you wish someone to make this baking powder you must find them yourself. Now, please. I wish to get back to real work. Do not bother me with 'cooking.'"

"Herr Doctor Gribbleflotz, we can pay, and pay well for this baking soda. Won't you please reconsider?"

Phillip looked at Tracy over the lenses of his spectacles, the watery eyes staring. "*No*. No amount of money can compensate for the distraction from real science." He turned away and started to take his leave.

"What about a couple of sets of clothes? Tailored to fit. With pockets, zippers, and buttons. In the fabric of your choice." Tracy was almost desperate.

Phillip stopped midstride and turned to look at Tracy. Then Ted. His eyes traveled up and down Ted, examining the denim trousers, linen shirt and leather jacket. "I want shoes like yours, Frau. With the elevated heel."

"Yes, even shoes with elevated heels."

Smiling at Tracy's complete capitulation Phillip returned to the seat across the table from her. "Give me

another look at that recipe. I believe we can talk business."

* * *

Herr Doctor Phillip Theophrastus Gribbleflotz watched the American man and woman walk away. He ran his fingers through his goatee beard as he looked into the distance, seeing himself in his new clothes. A fine figure of a man, commanding, dignified. The target of envy from less fortunate beings. Drawing his attention back into his rooms, he looked about his shabby quarters and laboratory. Maybe, if the Americans were as good as their words, he could move into accommodations more befitting Herr Doctor Phillip Theophrastus Gribbleflotz, the World's Greatest Alchemist. With the funds they promised he could employ laborants to do the dull repetitive tasks. Yes. If the Americans came through he could purchase some of that new glassware Herr Geissler was making after his visit to Grantville. With the areas of investigation the new glassware opened, soon those narrow-minded imbeciles of the university would kneel before Herr Doctor Phillip Theophrastus Gribbleflotz, the World's Greatest Alchemist, begging him to accept one of their diplomas. Begging him to join the staff of their university. One day . . .

* * *

Sunday lunch, Tracy and Ted's place

"Well?" Tasha asked significantly, staring inquiringly at her cousin by marriage. "Did you find us an alchemist to make baking soda?"

Holding her mug in both hands Tracy took a sip of tea before looking over the lip of the mug at the expectant faces surrounding her. "No." She paused, teasing them. The quiet groans of disappointment were interrupted by Danielle breaking into a fit of the giggles. "We found someone better." With that Danielle started to roar with laughter. Tracy limited herself to a broad smile as she, too, tried to imagine Herr Doctor Phillip Theophrastus Gribbleflotz as being "someone better." "The guy is a bit of a pompous ass. But at least he is willing to make our baking soda."

"When can he have it ready?" asked Mary Rose.

"At the moment he's only making a test sample. He said he needs at least a week for the urine to properly mature so as to produce the best spirits of hartshorn."

"Gross." Erin shook her head in disgust. "What are spirits of hartshorn?"

"Ammonia. Spirits of hartshorn is what it's called here and now. And quite frankly, I think it will be less trouble if we learn to use whatever names Herr Doctor Phillip Theophrastus Gribbleflotz wants to use."

Belle's forehead creased. "Hang on. He's a doctor? But you said you couldn't find an alchemist."

"He's not an alchemist. For that matter, Ted and I are pretty sure he's not even a doctor. At least not from any reputable university. Anyway, he said he could deliver a couple of pounds in about two weeks' time."

* * *

Two weeks later, Sunday lunch at Belle's

"Now for the big test. Everybody take a bite and let's see what we think." Belle passed a plate of

steaming biscuits around the table.

"Mmmm, nice. Different from baking powder biscuits, but still very good," Tasha volunteered. The other women nodded and agreed that the biscuits were good.

Tracy looked over her friends, "So we are agreed that Dr. Phil . . ."

"Dr. Phil?" Belle's raised eyebrows were duplicated by the rest of the girls.

"That's just Ted's name for Herr Doctor Phillip Theophrastus Gribbleflotz," Tracy replied.

"I thought he claimed he never watched Oprah?"

Tracy smiled at Belle. Ted had often made that claim. However, it seemed he had been a little economical with the truth. "Anyway, are we agreed that we should look at getting Dr. Phil making lots of baking soda?" At the nods of agreement, Tracy continued. "Then we have to think about raising capital. I've made enquiries. Dr. Phil will need to rent new facilities, buy additional hardware and supplies. He will also need to employ some people he can teach to do the work. We will also need to supply someone to manage everything when Dr. Phil loses interest and goes back to his pet projects. I'm thinking that if all the family can contribute maybe a thousand dollars per household to the project we can raise at least twenty thousand dollars. That should be enough to get him started, and running for at least three months."

"Hang on, Tracy. What are we going to get for our investment?" Mary Rose frowned. "A thousand dollars is a bit steep for a few pounds of baking soda." The other ladies looked at Tracy, nodding agreement.

"I'm suggesting that we set up a manufacturing company with Dr. Phil as the head or consulting chemist. He gets paid a retainer, a share of any profits, and access to the company's supply of chemicals and facilities for his experiments. In exchange, he is responsible for ensuring the processes work, the staff he trains are capable of doing the work they are paid for, and," Tracy paused dramatically, "the company owns anything he develops on company time, or using company facilities or chemicals."

"Nasty." Belle licked her lips in anticipation. "Can you enforce that last condition?"

"Herr Hardegg of the legal firm of Hardegg, Selfisch, and Krapp seems to think so. He doesn't expect any problems dealing with Dr. Phil. He did, however, suggest that Dr. Phil have a large share of the company. Something like fifty percent. Although he did agree that forty-nine percent would do."

"Are you saying your Dr. Phil is worth twenty thousand dollars, Tracy?" Erin asked.

"I think so. Certainly there's nobody else offering to make baking soda. You do realize that there is a potentially big market out there, and whoever gets in first could dominate the market? I just think we should get in first."

"That recipe Amy got. You think someone else could get one?" a thoughtful Tasha asked.

"Yes," replied Tracy. "And there are plenty of bright people in Grantville capable of following the recipe. However, if we get in fast we can lock in a lot of the local suppliers of urine. That's where some of the start-up capital will go. We also need an ice-making machine. Something that will work in Jena."

Mary Rose blushed. "If we lock in the local suppliers of urine? Hold it. How do we do that? Who are

the local suppliers of urine?"

Tracy grinned. "Ted claims that the various drinking houses produce buckets full every day. Currently a lot of it is being dumped via the sewage system. He reckons he and a couple of the cousins can modify the urinals so that the urine is diverted into some barrels rather than the sewer. If we offer to make the modification at no cost in return for the urine, he thinks we could lock in most of the taverns. They'll save on the toilet tax since they won't be pumping so much into the sewerage system."

"Those years with O'Keefe's are good for something then," Belle commented with a grin.

"Don't forget the papers in waste engineering Ted's done at college. But yes, he's happy to be able to make a useful contribution to this project."

* * *

Jena, the shop floor of Kubiak Country Laboratories (Jena): A few weeks later

Herr Doctor Phillip Theophrastus Gribbleflotz passed his eyes over the hard-working young urchins he had recruited as laborants to make the "baking soda" for the American women. He smiled to himself as he remembered his victory over naming of the product. Who would want to be known as the man who makes "baking soda?" Sal Aer Fixus, now there was a product to be proud of. Any alchemist worth the title would immediately respect the abilities of the man who can produce Sal Aer Fixus. Baking soda was for cooks.

"Hans." His high-pitched squeal penetrated the noise of the laboratory. "Did I tell you to stop grinding the ice maker?" All eyes turned to Hans, who had hastily returned to grinding the icemaker.

Phillip walked up and down the production line checking on his workers. For a pack of illiterate street refuse, they had taken to the work well. Most of them didn't understand what they were doing, but they were all capable of following his clear and concise instructions. At the ringing of a bell, everybody concentrated on finishing the current batch. As the batch passed from station to station, the youths cleaned down their work stations before helping other workers clean up. Soon, the batch was finished and ready for packaging in the fancy new paper bags the Grantville ladies had supplied. Waving his workers off to the noon meal, Phillip ran a finger over the image printed on some of the bags. A woodcut portrait with "Gribbleflotz's Sal Aer Fixus" written around the border. The image was very good, if he did say so himself. The artist had managed to catch his true essence. He appeared suitably regal and dignified. On the back of the bag there was more printing. There was a list of several uses for Gribbleflotz's Sal Aer Fixus, including a recipe for the America culinary atrocity they called "biscuits."

He gave the workroom one last sweep with his eyes. What he saw filled him with pleasure. The workroom and his personal laboratory had been fitted out to his specifications, with a few suggestions from the Americans, at considerable expense. The Americans themselves had come in and done much of the work setting up the laboratories. They now boasted "fume cupboards," something that was especially valuable when dealing with fermented urine and spirits of hartsthorn, and easy to drain hot and cold baths. There was even running water. Just as long as the tanks were kept topped up.

Passing into the dining room, Phillip waved the laborants back to the important task of eating. He well remembered the times when he had lacked sufficient to eat, and had insisted to the Grantville ladies that the laborants should eat as well as he and Frau Mittelhausen. His eye caught on a couple of the laborants. They were some of his best workers, in spite of being female. If they caused any trouble it would be up to Frau Mittelhausen to deal with it. After all, that was what she was paid to do.

He walked into his study. A cloth-covered tray sat on the table where he wrote up his research and did his accounts. Not that he had to do many accounts since the ladies from Grantville had encouraged him to join them in a company. Frau Mittelhausen did all that, and ran the household. All he had to do was ensure the baking soda was prepared according to the formula, and that sufficient quantity was being made. He relaxed in his chair before removing the cloth covering his lunch. The steam rising from his simple meal reminded Phillip of the meals he had been eating only a few weeks ago. Those meals had been anything he could buy cheaply and eat quickly before returning to his laboratory where he did assays and other work to finance his research.

He had recently started training a couple of the better laborants to do the assays. Soon he would be able to leave them to conduct the rote aspects of the assay work while he concentrated on more important things. Meanwhile, he was receiving a good income from the company just for supervising its production of Sal Aer Fixus. He smiled, remembering the contract the Grantville Ladies had had him sign. He received a salary, and a share of any profits. All without having to pay a*Pfenning* towards the costs of the wretched baking soda.

Dr. Phil's Amazing Lightning Crystal

by Kerryn Offord

Jena, Freedom Arches

Tasha Kubiak tried to tune out the pompous ass who was still pontificating. Somehow both Tracy Kubiak and Danielle Kowach, the two other members of the Kubiak Country partnership who could speak competent German, had managed to be needed elsewhere when this trip had come up. It was now two weeks since Dr. Gribleflotz had commenced deliveries of Gribbleflotz Sal Aer Fixus, also known as baking soda. But there had been no word from the good doctor about when he would commence production of baking powder. Someone had to travel to Jena to find out what the hold up was and do whatever it took to get Dr. Gribbleflotz making baking powder. Tasha had hoped her boss, Sebastian Mora of Mora's Café, would refuse to give her the time off to travel to Jena. However, as soon as Sebastian had heard she was going to ask about baking powder, he had all but packed her bags for her.

So here she sat, letting the drone issuing from the good doctor pass over her head. Growing restless while she waited for Dr. Gribbleflotz to finish, Tasha tried to relax. It wouldn't do to aggravate the good doctor by interrupting. In an effort to give her restless hands something to do she reached for her purse. Well drilled hands felt inside for the cigarettes and lighter. Still looking attentively at Dr. Gribbleflotz, Tasha expertly felt for a cigarette. There were only a few left. Did she really need the comfort a precious cigarette would offer? Yes.

It was the action of a moment to remove a cigarette and place it in her mouth. For a brief moment, just the time it took to put the flame to the end of the cigarette and to inhale that first blissful lungful of nicotine

laden smoke, she took her eyes off the doctor.

"What is that you have there?"

Tasha looked up. The change in tone and volume penetrated her best efforts to shut out his drone. She waved her left hand. The one with the smoldering cigarette in it. But Dr. Gribbleflotz didn't follow. His eyes were locked on her right hand. Looking down she couldn't see what was holding the good doctor's attention. It was just an ordinary cigarette lighter.

"It's a cigarette lighter." Tasha offered it for inspection. "You pull that jewel down and a spark ignites the gas."

Phillip looked at Tasha. Then, his eyes alight with interest, he carefully examined the lighter. He flicked it several times. Each time a flame issued from the hole on the top. "How does it work?"

Tasha stumbled mentally, trying to remember anything she had ever heard about cigarette lighters. "It uses a flammable gas for fuel. When you pull down the jewel the gas is turned on. At the same time, a spark lights the gas. It says lit as long as you hold the jewel down." Tasha felt quite proud of herself for remembering all of that. It was almost word for word the explanation her daughter Amy had given when Tasha had asked the same question.

"But what makes the spark?" Phillip asked, a little too controlled.

"Oh." Tasha looked back at the lighter Phillip held. This was getting too deep for her. "It's an electric spark. Pulling down the jewel completes a circuit which creates an electric spark which lights the gas."

"Electric spark?"

"Yes, like . . ." Tasha struggled for a synonym, something Dr. Gribbleflotz might be familiar with. Her eyes reached out searching for something. And there it was. A pole towering above a building. A lightning conductor. "Like lightning, only much smaller."

Eyes wide, brows lifted almost to the back of his balding head Phillip looked back at Tasha, hastily dropping the lighter. "Lightning? You carry a lightning maker on your person?"

"No, silly." Tasha rescued her cigarette lighter, shaking her head gently. "Lightning is much more powerful. The electric sparks in my lighter can only jump a tiny distance." She held her thumb and forefinger a hair's breadth apart.

Carefully, Phillip reached out again for the lighter. Holding it once again, he tried to light it. "How does it store the lightning?"

"Oh, that type of lighter doesn't use a battery. It uses some fancy crystal that emits a spark when you pull down the jewel."

"The 'fancy crystal' stores the lightning and releases the spark when you pull the jewel?"

"Something like that. I do know it doesn't ever need batteries, though. We have one of the same kind of thingeys to light the gas range. It must be more than ten years old, and neither I or my husband has ever replaced any batteries."

Phillip looked carefully from the lighter to Tasha. Each time he glanced at the lighter he flicked it on. "Do you know how to make these crystals?"

"Oh, no. They're way beyond me. My daughter, though. She grew all kinds of crystals when she was at school. Why, if I remember correctly, she even grew some pezzi . . . piezo . . . ah . . . pezeyletric crystals for a science project once."

Eyes beaming brightly, Phillip took a deep breath. He carefully placed the lighter on the table in front of him. Releasing his breath, he looked Tasha in the eyes. "What . . . are . . . pezeyletric crystals?"

"They're crystals just like the one in the lighter. If you do something to them they throw out an electric spark."

"Can you obtain a 'cheat sheet' to make these pezeyletric crystals, Frau?"

"Oh, yes. My daughter, Amy. She made a wonderful display for her science project. It had pictures and even a working model that would spark."

"How long would it take to get a cheat sheet?"

"Oh, I don't have to get a cheat sheet. My Amy had all the details on her science project. With pictures and everything." Tasha looked up at Dr. Gribbleflotz, her eyes brimming with pride. "She got an 'A' for it and a certificate as well."

"Frau Kubiak. What does your daughter's 'science project' have to do with these pezeyletric crystals?"

Confused, Tasha looked at him. Surely it was obvious? "My daughter did a science project on pezeyletric crystals. All I have to do is dig it out of the back shed. I kept all her school projects you know." Tasha smiled to herself. She knew she had Dr. Gribbleflotz hooked. "I'll let you borrow my daughter's science project if you will start making us baking powder. Only as a loan, though. I want it back. Do we have a deal?" Tasha held out her right hand.

With one final look at the cigarette lighter, Phillip carefully passed it over and dropped it lightly into Tasha's waiting hand. "Only if I can follow the directions. If I can not make any of these pezeyletric crystals, then there is no deal."

Tasha thought about it. If her daughter could make pezeyletric crystals using household items, then surely he. "It's a deal." Tasha stood and collected her coat and handbag. A sudden thought sent her hand into her coat pocket. Pulling out an envelope, she waved it before passing it over to Doctor Gribbleflotz. "There's a bank draft in there for your share of the profits so far. Oh, and by the way, could you increase production of the baking soda? Please? More and more people in Grantville want to buy our baking soda."

"Sal Aer Fixus!"

"What?"

"Sal Aer Fixus. Not baking soda. Sal Aer Fixus. Baking soda is not a proper product for a great alchemist. I do not make baking soda. I make Sal Aer Fixus. Gribbleflotz Sal Aer Fixus. Remember that, Frau Kubiak." With that final utterance Phillip exploded to his feet and stomped off.

Tasha shook her head in amused disgust and watched the figure of Dr. Gribbleflotz disappear down the street. *It's a wonder he can stand upright with an ego that size*. Tasha turned to leave and was confronted by a waitress holding a tray. There was only a single piece of paper on it. Flicking her eyes to the face of the waitress, Tasha smiled. The good doctor had stiffed her with the bill for lunch. With a rueful grin, Tasha reached in her purse and dropped some money onto the tray. She waved off any change and left. Mission almost accomplished. Now, where did she put that science project?

* * *

Sunday. The Fellowship hall, after Mass

Patrolling the fellowship hall with the large teapot, Erin Zaleski came across the widow, Mary Anna Abruzzo. "Mrs. Abruzzo, would you like me to top up your cup?"

Mrs. Mary Anna Abruzzo took another sip of her tea and grimaced as she looked up at Erin. "No thank you, Erin. I have my own special tea." With a sour look at the contents of her cup, she took another small sip.

"Is there anything wrong with your tea, Mrs. Abruzzo?" Erin gave Mrs. Abruzzo a worried look. She was sitting at a table near a radiator in the fellowship hall and she had fair screwed up her face when she took that last sip.

"No, Erin. There's nothing wrong with the tea. If you like willow bark tea, that is."

"If you don't like it, why are you drinking it?"

"It's my arthritis, Dear. It helps relieve the pain."

"Isn't aspirin supposed to be good for arthritis Mrs. Abruzzo? Surely aspirin would be better than that willow bark tea?"

"Young lady, it's quite clear you aren't familiar with the price of things these days. Do you realize what aspirin costs these days? Twenty dollars a tablet, if you can get them. That's the black-market rate, mind. If the doctors will prescribe them you can get them cheaper, but not much cheaper. And me living on a pittance and dependent on the charity of my children."

Erin, a little lost for words, backed away, keeping an eye on Mrs. Abruzzo who grimaced over another sip of her tea.

* * *

Sunday Lunch, Belle's Place

"Hey guys, what do you think of the new baking powder?" Belle Drahuta looked around at the rest of the Kubiak Country directors. "Three cheers for Tasha. Hey, Tasha. How did you get the geek to make baking powder?"

Tasha Kubiak blushed. "I lent him some of Amy's old school science projects. He seemed fascinated by my cigarette lighter and wanted to make some of those funny electric crystals. I threw in a couple of simple electricity experiments, as well. You know. The lemon battery, and bubbling off hydrogen and oxygen. I was wondering if we could get one of those machines that generate electricity. You know, the

ones where someone stands on a wooden stool and puts a hand on the top shiny dome while someone turns a handle, and their hair goes all funny."

Tracy Kubiak shook her head. "You mean a Van de Graaf generator. I don't like our chances. It's not the sort of thing anybody around here would buy. The schools are probably the only places with them, and I doubt they're going to sell them for any price."

"Maybe some of the guys can make one. Tracy, you've still got a lot of your up-time stock haven't you?" asked Mary Rose Onofrio.

Tracy sneaked a quick look around. "Well, yes, but don't talk too loud. I don't want the wrong people suspecting what I might have stashed away for a rainy day."

Erin looked around the table. "Speaking of things stashed away . . . how is everybody for aspirin? I was chatting with Mrs. Abruzzo after mass. Did you know aspirin is going for twenty dollars a tablet?" Erin targeted her question at Belle's sister-in-law, Katie Jackson, a pharmacy clerk at Nobili's Pharmacy.

"I had heard that there was a black market in aspirin. The boss has been saying he should look into making his own pills. But, he just hasn't found the time," Katie replied.

There was a communal "Oh" and "arhhh" as an idea simultaneously dawned around the room. The Kubiak Country Ladies looked at each other, then turned to stare at Tasha Kubiak.

"*No*. Absolutely*no* . No way. I am not going back and beg the geek to make aspirin. It's somebody else's turn. Tracy. He doesn't scare you. Why don't you go and ask him?"

Tracy gave a little shiver. "I had Ted standing shotgun last time."

"Well, there you go. Take Ted with you again. Believe me, you're going to need all the support you can get. I bet he's elbows deep in that electricity stuff. He really hates spending time away from his precious experiments."

Tracy looked at her family. She wasn't actually related by blood to any of the ladies, but they were more family than anybody but her brother, Terry, had ever been. "Okay, if it's what everyone wants?" Everyone nodded. "Then Katie, could you ask your boss about a cheat sheet for aspirin? We'll have to arrange some kind of deal so he gets a royalty payment. Probably something similar to what we have with Christie Penzey for the baking soda and baking powder. Meanwhile, I'd like everyone else to hunt around at home to see what they have on experiments in electricity. Any old children's science books or home laboratory sets. I'd like to go visit Dr. Phil with something to trade."

* * *

Jena, Dr. Gribbleflotz's Study

"Now, when I pump away at the foot pedal, the two discs spin. When they spin they collect a static charge. Those bottles, the Leyden Jars, store the charge, and eventually, we have . . ." Crack. A spark leapt across the two terminals set above the Wimshurst generator.

Phillip's eyes lit up when he saw the spark. His new Lightning Crystals, even the biggest he had been able to grow, had only cast a spark barely a finger's breadth. This new machine the American was demonstrating had sent a spark more than a foot through the air.

Ted Kubiak carefully discharged the Wimshurst generator and the Leyden Jars before removing the jars. "And, if we could have a willing volunteer to stand on this stool, and touch this wand to the globe. Tracy, would you care to volunteer?"

"Ted, aren't you forgetting something?" Tracy asked.

"But this is important, dear." Ted tried to placate his wife. "I'm sure Dr. Gribbleflotz will be really impressed by the hair-raising experiment."

With a sigh sufficiently loud so that her husband could be in no doubt she was less than impressed, Tracy removed her coat and jewelry, took the wand in her right hand, and stepped onto the stool before shaking out her shoulder-length hair. "Well, what are we waiting for? Let's get this show on the road."

With Tracy in place, Ted started his foot pumping at the modified spinning wheel assembly that provided rotational force to the Wimshurst generator. After a few moments, Tracy's hair started to stand out. After a couple of minutes all of her hair was standing on end.

Fascinated, Phillip reached out towards her hair. "*No!*" Tracy screamed. But too late. Phillip leapt backward shaking his hand. Quickly, Ted discharged the generator and his wife before going to check on Dr. Gribbleflotz.

"Are you all right, Doctor? I should have warned you. That was a big charge you took there. You should never try to touch the generator or anybody being charged by it."

Phillip looked from his stinging hand to the American and his woman. The spark that had flown as he reached to touch the woman's hair had bitten him, but there appeared to be no real injury. Waving off the American's attentions, he approached the "Wimshurst generator."

"This is for me?" he asked. "Why?" Phillip was getting used to the way these Americans operated. They wouldn't have come bearing gifts unless they wanted something.

"We would like you to make some of these." Tracy passed over a sheet of paper and a small glass bottle.

Sparing a glance from his new lightning generator, Phillip spent a moment reading the paper. Even at a quick glance he realized he could make this . . . he did a quick re-reading of the title of the sheet . . . ASPIRIN. But to make this aspirin, he would have to spend time away from his latest line of research. And a very promising line of research it was. Electricity was simply fascinating. That Lightning Generator. In his mind's eye, he could already see people coming to his private salon to see it demonstrated. And there were the other electricity experiments. People in Jena had heard about the Americans' electricity. His salon would be the first place those people would be able to see it. Phillip looked back to his still stinging hand. And feel it. Better to discourage these Americans before they got too enthusiastic. "The price will be ten dollars per dose."

The American woman smiled. Smiled. She should have been outraged. Ten of those American dollars for a pill that cost less than a few*Pfennings* to make, and she was smiling.

"When can you start making them, Dr. Gribbleflotz? I don't think we should try for more than five thousand a week, to start with. At least until we can properly judge the demand."

Phillip was horrified. Thousands a week. The time away from his precious experiments. He would need to buy more cauldrons, more alembics, more retorts, and he would have to find and train more peasant children to do the work. And he would have to shop for the materials. Phillip sank into his chair and watched the American man and woman leave his study. Idly, he reattached the Leyden Jars to his new Lightning Generator and started pumping the foot pedal. He sat in contemplation, absently watching the sparks of lightning leap through the air between the terminals.

Phillip didn't hear the knock on his study door, or the sound of it opening. It was the stifled cry of amazement from Frau Mittelhausen that brought him out of his thoughts. Looking up he saw the look of wonder on his housekeeper's face. "Frau Mittelhausen? Frau Mittelhausen? Is there a problem?"

"What? No. No problem, Herr Doctor Gribbleflotz. The Americans said that you would require me to make some purchases." Frau Mittelhausen looked back at the still sparking Lightning Generator. "What is this wondrous machine? How does it produce lightning from thin air?"

"A better question might have been 'what do the Americans expect in exchange for this wondrous Lightning generator?'" Phillip picked up the small glass bottle. Inside it were a few white tablets. Up-time aspirin, the woman had said. Phillip shook his head and moved to his desk to start doing some calculations. It took only moments to write a list of what he would need. He handed it to her. "Frau Mittelhausen, I need you to go out and purchase these items. Also, I will need more workers. Can you handle more apprentices?"

She glanced at the list and nodded. "I will need to employ another assistant. Do you wish for me to find the additional workers? I'm sure your current group of laborants have family and friends who would be interested in employment in your new manufactory."

"Frau Mittelhausen, I am*not* a manufacturer. I am an*alchemist* . Just because I train street refuse to make the products the Americans want does not make me a*manufacturer* . Do you understand me, Frau Mittelhausen?"

"Yes, Herr Doctor." Frau Mittelhausen gazed longingly at the lightning generator. Gently, she reached out a hand towards it.

"*No!*Do not touch it."

Frau Mittelhausen leapt backward, her hands wrapping themselves around her body, the sheet of requirements crushed in her hand. She looked at Dr. Gribbleflotz, shock showing on her face. Dr. Gribbleflotz had never used that tone before.

"The machine bites if you are not careful, Frau Mittelhausen." He waved his hand so she could see the red mark on his fingers. "I have already been bitten. Nobody is to touch the lightning generator. Please ensure that the rest of the staff know. Meanwhile . . ." He ran a hand over the books the Americans had delivered with the Lightning Generator. "I need to do a little reading to understand what is happening."

"I will get onto the purchases and recruitment of new workers immediately Herr Doctor." Her eyes alternating between Doctor Gribbleflotz and the wondrous lightning machine, Frau Mittelhausen backed out of the study. She closed the door after one last look at the wondrous Lightning Generator.

Dr. Phil's Aeolian Transformers

by Kerryn Offord and Rick Boatright

Jena

It had been a hard day of almost wasted discussions with the scholars at the university. John Grover and Ken Butcher, accompanied by Derrick Mason, a young radio operator on loan from the army, had been trying to identify the materials and skills available down-time for the manufacture of earphones for crystal radios. They had hoped that it would be an easy matter to find people capable of making the wire-wound headsets at a sufficiently low price that affordable crystal radios could be made, allowing anybody to listen in to the broadcasts of the Voice of America. As things stood, there were about ten thousand up-time radios that could receive the signal. However, they were expensive. What was needed was a crystal radio set that anybody could make or buy extremely cheaply. That way, the Voice of America radio broadcasts would be able to reach everybody, not just those who could afford an up-time radio and a power supply.

Father Gus, who had been pressed into service as an interpreter, sat with the Americans while they continued to discuss the problems surrounding cheap earphones with a couple of members of the Jena faculty. Listening in, interpreting as needed, Father Gus considered the problems. They needed to wind thin copper wire around "magnetic" iron to somehow convert their "electric signals" into sound. The concept sounded extremely interesting, if such a thing was really possible.

That had been part of the problem. The Americans had come into Jena with a certain reputation for outlandish ideas and inventions. People, however disbelieving, had been prepared to listen. However, sound from the air? If it hadn't been for the*two-way radios* they had brought with them, nobody would have believed them. Even with the two-way radios as proof, many were still unconvinced that they could be made.

* * *

"Hello, Dear. Have you been having fun?" asked John Grover's wife, Leota.

Father Gus had to smile. John's wife, Leota, Ken's wife, Sarah, and Ken's sister-in-law, Esther Sloan, presented quite a sight with all their bundles and baskets. They were settling down and displaying their booty from a lightning raid on the unsuspecting shops of Jena.

"You'll never guess what I managed to get," Esther said. She pointed to a heavily laden basket. "It's almost impossible to get in Grantville. But here in Jena, I managed to pick up a whole ten pounds of Gribbleflotz Vin Sal Aer Fixus, and the price was less than in Grantville."

"That's marvelous, Esther. Can I buy some off you?" asked her sister, Sarah.

"There's still some left in the shop. Most of this lot is destined for the school cafeteria. We've been forced to feed the students sourdough bread, but with the Gribbleflotz Vin Sal Aer Fixus, we can do biscuits again. The students have almost been up in arms having to go without biscuits."

A rustle of paper drew all eyes to Leota and the flyer she was spreading out on the table. "What's that, Leota?" Esther struggled to read the upside-down flyer.

Leota looked up at Esther, then placed the flyer down where her husband could read it. "When you mentioned the name Gribbleflotz, I suddenly remembered this. It's a flyer advertising seminars on the 'Philosophy of the Essence of Lightning,' which are being given in the private salon of a Dr. Gribbleflotz. Apparently, the man gives demonstrations of 'The Wondrous Lightning Generator,' 'The Amazing Lightning Crystals,' 'Storing the Essence of Lightning,' and 'Continuous Lightning.' It sounds a lot like the kind of things the early scientists used to do. John, maybe you can drop by and see what the man has. It could be interesting."

Father Gus had been translating as best he could for Dr. Werner Rolfinck, Dean of the Jena Medical College, and Dr. Willi Hofacker, a senior lecturer in iatrochemistry and medical botany. When he mentioned Dr. Gribbleflotz though, both men started to go red. Frau Grover had barely finished speaking when Dr. Rolfinck exploded. Father Gus struggled to keep up as the invective flowed from the good doctor.

"Dr. Rolfinck says that this Dr. Gribbleflotz is little better than a charlatan. These philosophical seminars are little more than cheap demonstrations of lesser technology with an unscholarly commentary pretending to explain what is being shown."

There was a pause while Father Gus listened to a quick discussion between Dr. Rolfinck and Dr. Hofacker. "Apparently, this Dr. Gribbleflotz has no true credentials. He has failed miserably in the university courses on iatrochemistry. The man claims to be related to the Great Paracelsus, father of modern medicine. But the doctors doubt it. He is totally lacking in scholarly skills. He was little better than a self-employed laborant until he started making cooking powders for the American women. That was about his level, they claim. Though, I do wonder why the invective. I wonder what they have against the doctor?"

Sarah wrinkled her forehead. "Yes. If they don't think he has credentials, why are they even letting him call himself 'Doctor?' I thought that was a protected title?"

Father Gus smiled at Sarah before turning to talk to the doctors. Moments later he had an answer. "They say they dare not challenge him on his doctorate. Apparently, he is doing quite well with his little 'blue balls of happiness,' his Gribbleflotz Sal Vin Betula. With the money from that he has retained the services of Herr Hardegg of Hardegg, Selfisch, and Krapp, a Rudoltstadt legal firm with a certain reputation. The good doctors are not rich men. They cannot afford to defend an action of slander."

Dr. Rolfinck had been trying to calm down while Father Gus translated for the Americans. But when Father Gus mentioned Sal Vin Betula, he again exploded. Father Gus tried to calm Dr. Rolfinck.

After a moment, Father Gus explained. "The dean is a little upset at the unscholarly name Dr. Gribbleflotz has given his little blue pills."

* * *

Jena, outside Herr Doctor Gribbleflotz's Private Salon, later that same day

"Well. That was a complete screw up. What did you have to go and laugh at his 'Wondrous Lightning Generator' for anyway, Derrick?" John Grover asked.

Derrick Mason grinned. "It wasn't the generator I was laughing at, Mr. Grover. Whoever made it used a couple of old 78s for the rotating discs. I was just laughing at their titles."

"Well, it was pretty unfortunate timing. He had just demonstrated his Amazing Lightning Crystal. It was a piezoelectric crystal. I'm not sure what type, but apparently he grew it himself. I was at the point of asking him about making some more for us when you cracked up." John looked at Derrick. "He was not impressed when you started laughing." John turned to Father Gus. "Father, what do you think?"

"Herr Grover, I am very much afraid the good doctor took deep offense. I can not be sure, but the way he immediately called upon his housekeeper to have us shown out . . . I think he may have felt your man was laughing at his lightning generator." Father Gus gave Derrick a penetrating look. "Also, I believe Herr Doctor Gribbleflotz's English may be a little better than he lets on. I noticed he paid attention when Herr Mason commented on how all of his experiments were really simple. I think he was ready to take offense."

Father Gus turned to John Grover and Ken Butcher. "I do hope you do not need the good doctor's services. I do not think Herr Doctor Gribbleflotz will forgive easily."

* * *

"John, how did your visit to the electricity man go?"

John sighed. "A bit of a mixed bag, Leota. Dr. Gribbleflotz has an interesting range of electrical toys, and his amazing lightning crystal is a piezoelectric crystal. I was talking to him about sourcing some of the crystals when the comedian here decided to laugh around the good doctor's lightning generator. From the manner in which we were invited to leave, I don't think the doctor is going to be too enthusiastic about helping us."

"What do you want the crystals for, John?" asked Esther.

It was Ken Butcher who responded. "If they are piezoelectric crystals and he can make more, well . . . depending on the price, we might have an answer to our headset problem. Rather than use wire coils, we can use fine piezoelectric crystals. John and I are trying to remember any recipes for piezoelectric crystals, but we're coming up blank. If this Dr. Gribbleflotz can make them, then, based on the opinion of Doctors Rolfinck and Hofacker, I reckon we should be able to make them as well. I sure would like to know what he's making and where he heard about them, though."

Esther grinned. "Where is easy. He probably heard about them from one of the Kubiak Country people."

"The who?"

"The Kubiak Country people. Look, here." Esther passed over a bag of Gribbleflotz Vin Sal Aer Fixus and pointed to the printing on the package. "See. It says 'Made by HDG Enterprizes (Jena), a branch of Kubiak's Country Industries (Grantville).' The address is up Mahan Run, which isn't surprising if the Kubiak clan is behind it. Anyway, if you talk to one of the Kubiaks up on the Run, I'm sure you'll find someone who can help you."

* * *

Head Office, Grantville Canvas and Outdoor, Mahan Run, Grantville

John Grover turned to his wife. "Are you sure this is the right place?" He was sitting on his horse, outside

the front gate of Ted and Tracy Kubiak's home.

Leota nodded. "Yes, dear. This is the right place. Careful how you cross the cattle guard now."

With a sour "teach your grandmother to suck eggs" look, John carefully guided his horse over the cattle guard and waited for Leota. They could hear the yipping of a dog while they rode up the drive to the house. John and Leota tightened the reins and halted their horses until the source of the noise came into view. It was a small dog. A Jack Russell terrier. Before it could get under the horses' feet there was a loud whistle. The dog stopped in its tracks. Shortly afterwards, a man walked up, bent down and lifted the excited animal up to his chest.

"Hi, John, Leota. Can I help you?" Ted Kubiak waved a greeting while struggling to keep a firm hold on his dog.

"My wife and I are looking for the Head Office of Kubiak Country Industries. We were directed here. I was just wondering if we've come to the right place?"

Ted smiled up at the mounted couple. "Yep. You've come to the right place. Tracy's working up in the house. If you'd like to tie your horses to the corral by the shed, I'll lead you to her."

Ted waited while John and Leota loosened the cinches and tied their mounts to the corral. When they finished tending to their horses he released Ratter, who immediately ran up to John and Leota. The dog sniffed around them for a moment, then turned and trotted off. When John and Leota joined him, Ted asked, "So, what's your poison? Gribbleflotz Vin Sal Aer Fixus, Sal Aer Fixus, or Sal Vin Betula?"

John stared at Ted, a grin appearing, "None of the above. I was wondering if you know anything about Dr. Gribbleflotz's Amazing Lightning Crystals, though. We were in Jena and Leota here picked up a flyer advertising seminars on the 'Philosophy of the Essence of Lightning.' So me, Ken Butcher and a couple of other guys went visiting. I was just watching him demonstrate his lightning crystal when Derrick Mason, one of the other guys, started laughing around the doctor's lightning generator. Before we knew what was happening we were out the door."

Ted stopped suddenly. John and Leota to bumped into each other. "You have had a run in with Dr. Gribbleflotz?" Ted's voice was stilted.

John nodded. "Unfortunately. We were in Jena hoping to find out about affordable ways of making headphones for the new crystal radios. When I saw the flyer, I wondered if the lightning crystal might not be a piezoelectric crystal, because if it was, that might be a solution to our problem. Anyway, as I said. Derrick cut loose a belly laugh and we were all but thrown out before I could ask any questions."

About then they made their way into the study. Tracy was crouched over a computer, working. She kept working until Ted spoke. "Tracy, a couple of people to see you."

Tracy jumped. "Huh? What?" She turned away from the computer. "Oh. Hi, Leota, John. Did you want to speak to me?"

"Yes, Tracy. John was wondering if you know anything about a Dr. Gribbleflotz and his Amazing Lightning Crystal?" Leota asked.

Tracy looked at John. "What is it you want to know, John?"

"Well. We were in Jena when we heard about him and his Amazing Lightning Crystal. I was wondering what he was using. We need something like his piezoelectric crystal if we want to spread the radio service. Without a cheap piezoelectric crystal, we won't be able to make affordable radios for the masses."

"Why didn't you ask Dr. Gribbleflotz?" Tracy was a little confused.

"Err." John paused and turned to look to his wife for support.

"What John is trying to say is; they tried to speak to Dr. Gribbleflotz and screwed up. They were just about thrown out of his house. He is hoping you, Kubiak Country Industries, might know something about the crystals, and if you could get us some."

"Oh, Leota. John. I hope you didn't upset him." Tracy looked toward John. "John, just how did you 'screw up?'"

"Derrick Mason was looking over something the doctor called his lightning generator—"

"The Wimshurst generator," Tracy muttered, identifying the offending article.

"The what? Oh, yes, a Wimshurst generator. I remember using one years ago. Anyway, Derrick was looking at it when suddenly he started laughing. Dr. Gribbleflotz took offense and had us shown out." John held up his hand halting the obvious question, "Derrick says he was laughing at the titles on the records being used as the static generating discs."

Tracy looked over at Ted. "Do you have anything to say?"

Ted shrugged his shoulders, a guilty grin on his face. "Do you know which one he laughed at? There was 'That Old Black Magic' by Spike Jones and his City Slickers, and 'Stormy Weather' by Carmen Cavallaro. I'm quite proud of the Spike Jones one. Given how Spike used to use expedient materials as instruments. Somewhere, we should have a recording where he used a selection of carefully tuned revolvers. And for a static generator, I thought 'Stormy Weather' was a good pick. But I wouldn't think Dr. Gribbleflotz would take offense at a harmless joke like that."

Leota sighed. "If only that was all. Apparently Derrick made a few innocent comments about how he had done things just like all of Dr. Gribbleflotz's demonstrations while he was at school. John and Ken took Father Gus with them to help translate. He thinks the guy understands more English than he lets on. Anyway, Dr. Gribbleflotz took offense, and that was that. Which reminds me, why do you call him Doctor? My understanding is that he doesn't have a doctorate."

Ted and Tracy grinned at each other. "Oh, he has a doctorate all right. Not from one of the best institutions, of course." Tracy gave her husband a harmless slap when he started to laugh and turned to give Leota a "what can you do with the man" look.

"But Dr. Rolfinck was absolutely sure that Dr. Gribbleflotz wasn't entitled to the title," John said.

A smile lit Ted's eyes. "If this Dr. Rolfinck is so sure Dr. Gribbleflotz is not entitled to be called Doctor, why doesn't he do something about it?"

"Because Dr. Gribbleflotz can apparently afford a good lawyer . . . Oh." Wide eyed, John turn to stare at Ted and Tracy. "'Not one of the best institutions?' You don't mean a diploma mill? An honest to

goodness Mail Order Diploma?"

Straight faced, Tracy spoke, "Dr. Gribbleflotz is a prima facie Doctor of Philosophy. I have seen the diploma. Real sheepskin, with a fancy embossed seal."

"Wow." John shook his head, then found himself a seat. "Are you sure? The scholars at Jena could contest the diploma. Will it stand up in court?"

"Our lawyers have the utmost confidence in the stature of the issuing institution."

John licked his dry lips. "I'll take your word for it. But that doesn't help me. What will help is getting some of the doctor's lightning crystals. Do you know what it is?"

Ted and Tracy exchanged a glance. Ted gave a slight nod of his head. Tracy turned back to John and Leota. "Rochelle salt."

"Oh," A light started to dawn for Leota. "Gribbleflotz Vin Sal Aer Fixus," she pronounced. Seeing the question in her husband's eyes, she elaborated. "Dr. Gribbleflotz is making baking powder. Baking soda and cream of tartar are needed for baking powder. You can also make Rochelle salts from the same ingredients."

John tried to suppress his excitement. "Is this right? Your Dr. Gribbleflotz is making Rochelle salts?"

"Gribbleflotz Amazing Lightning Crystals, please." Ted held up his hand to silence John. "Just a moment. I have something you should see." Ted turned to the door and called. "Richelle, could you bring in one of the GribbleZippos please?"

Ted grinned. "This you have to see."

A teenage schoolgirl with a baby in her arms walked into the study and passed a small object over to Ted. She passed curious eyes over the guests. Then, she gave a gentle wave before leaving. "That was Richelle, our adopted daughter," Ted said. "Anyway, John, have a look at this lighter."

John took the lighter in his hands. It was shaped like an oversized up-time Zippo. He opened it and looked at the mechanism. Instead of a flick wheel, there was a simple lever. John pushed the lever. There was a spark and the wick lit.

John looked from the lit lighter to Ted and Tracy, then back at the lighter. He gave it a closer examination. "A piezoelectric lighter? You're making piezoelectric lighters?" At Ted's nod, John smiled. "Do you have a supply of Rochelle—" Seeing Ted's reaction, John hastily changed what he was saying, "a supply of Gribbleflotz Amazing Lightning Crystal?"

Ted nodded. John let out a long sigh of relief. "I don't suppose you could sell me a pound or so?"

"Sure. Not all at once, though. But if you can afford to wait, I have a few ounces to spare, and I can ask Dr. Gribbleflotz to make some more. There'll be a price though."

"Hell, at the moment I'm prepared to pay just about anything. How much?"

"I wasn't thinking about money, John. Dr. Gribbleflotz is doing quite well as it is. The few dollars for a few ounces of his Amazing Lightning Crystal is neither here nor there. What he will really want is

something more than money."

* * *

Jena, an Inn

Dr. Werner Rolfinck, Dean of the Jena Medical College, was quietly seething. Beside him, Doctors Conrad "Kunz" Herbers and Wilhelm "Willi" Hofacker, both lecturers in iatrochemistry, were also suppressing their anger. There, in pride of place in one of the best inns in Jena, that charlatan Dr. Gribbleflotz was describing his philosophies to an enthralled audience.

"This up-time 'chemic,'" Dr. Gribbleflotz was saying, "is fine for technicians, cooks, and industrial processes. It certainly allows unlettered peasants to tend my caldrons and alembics and produce their powders and potions, but it completely*ignores* the spiritual component of alchemy." Phillip looked over his attentive audience. "Did you know that the up-timers produced Sal Vin Betula pills which were*white* ?" At his audience's collective shaking of heads, Phillip nodded. "Yes, it is true. White. For a pill that is supposed to reduce pain and reduce fever. When every competent alchemist knows blue is a soothing color that reduces pain and a cool color that reduces fever. They are such children in the Great Art. As my Great Grandfather Paracelsus—whose namesake I am—said: it isn't enough to treat the body, one must treat the spirit. Which is why*my* amazing headache pills are superior to what the up-timers have, for my Sal Vin Betula pills are pale blue. Yes, Dr. Gribbleflotz's Little Blue Pill is your friend."

Phillip paused for breath. He looked up, made eye contact with Doctors Rolfinck, Herbers, and Hofacker. He raised a hand in silent greeting before continuing his discourse.

"The nerve of the man. Did you see that? He waved to us as if we were his colleagues," muttered Dr. Rolfinck. "We are going to have to do something about the man. His conceit is beyond words. We have to do something about him."

Dr. Hofacker shook his head. "Our hands are tied, Dr. Rolfinck. The radio people passed on the news that Dr. Gribbleflotz holds a doctorate from an institution of some stature. It is best we ignore him."

While the doctors drank to drown their sorrows, on the other side of the common room Phillip continued to talk to his audience. He was getting into his stride talking about the topic dearest to him. Dr. Phillip Theophrastus Gribbleflotz.

"Of course there are some up-timers that have a clue. I have been pursuing references in their library's collection about pyramids, and crystal power. While much of it is obviously in conflict with well-established systems, some of their points are most amazing." Phillip removed his spectacles and drew a special up-time cleaning cloth from a pocket in his up-time style jacket. He exhaled onto the lenses and wiped them. After he slid the spectacles on, he smiled at his audience. "I am particularly interested in the combination of gems with the new metal, aluminum. My careful calculations, corroborated by a most interesting tome in the Grantville Public Library, suggests that a pyramid composed of aluminum members with the appropriate colors and cuts of gems at the strategic points, especially these new faceted gems, could result in the invigoration of the*Quinta Essentia* of the Human Humors. I am*most* anxious to pursue it. But as always, funding is problematic. Perhaps the new Aeolian Crystals will assist in it."

Phillip looked over his audience again. He had them in the palm of his hand. Tonight's crowd would be happy to go home and spread the words of Dr. Phillip Theophrastus Gribbleflotz, the Worlds Greatest Alchemist.

"You have heard of the Gribbleflotz Aeolian Crystals I am supplying the up-time radio technicians?" It was a rhetorical question. Aeolian Crystals were too new for any of the audience to have heard of them yet. "They allow the conversion of the Essences of Lightning the technicians have captured in their singing wires to be converted into sensible sounds. The crystals themselves sing. The up-timers insist on referring to them as "Rochelle salts," but I can assure you that they have*no* parallel in Rochelle, or any other part of France. No, the singing Aeolian Crystals are a purely German product of German alchemy and up-time technology." Dr. Gribbleflotz paused dramatically. "We are calling the 'earphones' Gribbleflotz' Aeolian Transformers. They are*much* better than those simplistic mechanical earphones produced by the jewelers' guild. Wire and bits of Iron! Ha! Cold Iron can never compete for the spirits of Sound with Salts of Sound Itself!!"

NON-FICTION

Exegesis and Interpretation
of
Up-timer Printed Matter

by Francis Turner

Derived from my Hobson's Choice story, this article is about a subject that I think people frequently think is simpler than it actually is. It is my belief that down-timers who get their hands on purloined up-time books will generally have a hard time figuring out what is being talked about. Of course, in Grantville this is not too much of a problem since there are plenty of people who can interpret and/or answer questions. But a copy of a copy that makes its way to Spain (say) is going to be a whole different kettle of fish.

Some things to consider when examining a modern magazine from the point of view of a down-timer are:

1. linguistic changes including new words from foreign tongues (kamikaze, thug, gringo), chaynges inn spelinge, slang . . .

2. hidden assumptions of technology or science (e.g. electricity)

3. geographic changes (names of countries, regions, cities etc.)

4. advertisements

What Is Exegesis?

Exegesis is defined in the dictionary as "Exposition; explanation; especially, a critical explanation of a text or portion of Scripture." It is the sort of thing that monks, theologians and other literate people of the seventeenth century did all the time and is a word they would understand even if it is somewhat less well known today. Interpretation of a text is effectively just a translation; exegesis attempts to put the translation into context. Exegesis is the piecing together of clues from a variety of sources to arrive at the "correct" meaning for an obscure piece of text.

When the King James Bible was translated it involved a large amount of exegesis. The translators attempted (with only indifferent success) to locate Greek, Aramaic and Latin versions of the bible and then compare the different versions to try to determine what the original text was that should then be rendered into seventeenth-century English.

One thing that exegesis tries to solve is the case where there is a choice of meanings because a word has mutated over time or is a homonym. A good example of this is the seventy-two virgins that some interpretations of the Koran believe is the reward awaiting martyrs in heaven. Because of the way the Koran was written down originally there is considerable dispute about whether the relevant word really means virgins; it could apparently mean a lot of things, including a sort of white grape.

How Long Will This Be A Problem?

For historians in the 1632 universe, it will always be a problem because English will not develop in the same way as it did in this universe. For the majority of people, though, it is likely to be a shorter duration problem because eventually all the useful up-time literature will be translated into down-timer German and probably Latin and possibly English and French. Moreover, there will also be produced basic primers of up-timer English and culture that will assist those who need the knowledge in much the same way that we use phrasebooks and dictionaries when traveling today. But, of course, anyone who stumbles across an up-timer newspaper hidden in an attic in 1793 will need to go and find a professional historian to help translate or dig up his primer of up-timer English.

Undoubtedly, in Grantville and surrounding/allied territories such primers will be quickly available, however although they can help with problems 1 and 3 above (and explain the concept of 4), problem 2 is going to remain a problem for people who haven't been exposed to the relevant technology. Without knowledge of what an automobile is, for example, expressions such as "when the rubber hits the road," or "putting your foot to the floor," or "coming to a screeching halt" can be translated but the translation will lack much of the subtlety of the original and may therefore contribute to a cascading series of misinterpretations like the virgin/grape confusion mentioned above. However, such primers will never be able to list all concepts and phrases and will never be universally distributed so problems will remain. Scholars who are not allied with Grantville and lack direct access will undoubtedly study obscure up-timer texts for quite a few years and they will need the techniques of exegesis to do so successfully.

The Challenges of Up-timer English

The greatest challenge is undoubtedly that the up-timer documents are in English. Thus the first requirement for a down-timer who has gotten his hands on some Grantville printed matter is to locate someone who can read English well, which is not as simple as one might think. Although Tudor and early Stuart England (and Scotland) had produced many works that today are universally recognized as classics, in the 1630's their fame had yet to escape the British Isles. English was, quite simply, not a language much learned in the 1630's by foreigners. The international language of scholarship was Latin and works not written in Latin were generally shunned. Thus most people would learn their own native tongue and Latin during their education. Further languages learned would generally be the ones of the major continental powers, that is to say, German, French and Spanish. Indeed this remained generally true for a considerable period. An ancestor of mine who traveled central and southern Europe in the mid 1800's had a number of useful conversations with academics and clerics in Latin since he did not speak

either Italian or German and some of his conversants could not speak French (his other modern language). Merchants and traders would, of course, learn other tongues; thus countries with trade with England, such as Holland and France, might have significant numbers of English speakers, especially in cities and ports, but other lands would typically have extremely limited numbers of them.

The second related challenge is the malleability of English and the lack of reference materials. To understand this it helps to look at works published in English at the time. Consider, for example, *Hakluyt's Voyages* , which was produced near the end of Elizabeth's reign, or the various versions of the Book of Common Prayer. One is immediately struck with the lack of the letter*J* and the mixing up of*U* and*V* not to mention the usage of*Y* as the (Icelandic) thorn (þ = th sound) and the frequent abbreviation of common words. Today we have different idiosyncrasies, such as the acronym, which would appear just as peculiar to a seventeenth century reader. Spelling was quite radically different (and inconsistent) and although there was an English dictionary (Robert Cawdrey's*Table Alphabeticall* , first printed in 1604) it only contained about three thousand words, many of which are not used (or used differently) today.

The third related challenge is the changes in handwriting. This will not, of course, apply to people who manage to get original books or photocopies, but those unfortunates who end up with handwritten copies or stolen notes will discover problems. Again this sort of thing is easy enough to figure out when you have someone to ask but it is a lot harder if you are stuck on your own without anyone to help.

When Interpretation Is Easy

Sometimes, of course, it is reasonable for down-timers to find it easy to understand up-timer literature. Exegesis is easy when the book is intended to teach. Encyclopediae are easy and school textbooks are generally easy because they will proceed in a logical fashion and will have diagrams and sidebars explaining things. In addition, the context of the words are easy to grasp and, generally speaking, refer back to things discussed earlier. Of course book 3 of high school physics (for example) may refer back to things in book 2, but in my experience there will be a short reminder section before anything that is complex and important. Even in the event of excerpts (such as a particular entry in an encyclopedia), the text will normally be simple and not require additional data. Consider a random article in the 1911 *Encyclopedia Britannica* for example:

http://1911encyclopedia.org/I%5CIN%5CINDIAN_OCEAN.htm

INDIAN OCEAN, the ocean bounded N. by India and Persia; W. by Arabia and Africa, and the meridian passing southwards from Cape Aguihas; and E. by Farther India, the Sunda Islands, West and South Australia, and the meridian passing through South Cape in Tasmania. As in the case of the Atlantic and Pacific Oceans, the southern boundary is taken at either 40 5., the line of separation from the great Southern Ocean, or, if the belt of this ocean between the two meridians named be included, at the Antarctic Circle. It attains its greatest breadth, more than 6000 m. between the south points of Africa and Australia, and becomes steadily narrower towards the north, until it is divided by the Indian peninsula into two arms, the Arabian Sea on the west and the Bay of Bengal on the east. Both branches meet the coast of Asia almost exactly on the Tropic of Cancer, but the Arabian Sea communicates with the Red Sea and the Persian Gulf by the Straits of Bab-el-Mandeb and Ormuz respectively. Both of these, again, extend in a north-westerly direction to 30 N. Murray gives the total area, reckoning to 40 S. and including the Red Sea and Persian Gulf, as 17,320,550 English square miles, equivalent to 13,042,000 geographical square miles. Karstens gives the area as 48,182,413 square kilometres, or 14,001,000 geographical square miles; of these 10,842,000 square kilometres, or 3,150,000 geographical square miles, about 22% of the

whole, lie north of the equator. For the area from 40 S. to the Antarctic Circle, Murray gives 9,372,600 English square miles, equivalent to 7,057,568 geographical square miles, and Karstens 24,718,000 square kilometres, equivalent to 7,182,474 geographical square miles. The Indian Ocean receives few large rivers, the chief being the Zambezi, the Shat-el-Arab, the Indus, the Ganges, the Brahmaputra and the Irawadi. Murray estimates the total land area draining to the Indian Ocean at 5,o5o,ooo geographical square miles, almost the same as that draining to the Pacific. The annual rainfall draining from this area is estimated at 4380 cubic miles. . . .

In this geographic article the only elements required would be knowledge of place names, longitude and latitude and the length of a mile/kilometer and, as the article progresses, the definition of the temperature degrees. There are occasional more complex words and references to obscure things (e.g. cable ships) but they rarely disturb the narrative and provide corroborating detail rather than vital facts.

Exegesis is also easy when the subject matter is historical to the up-timers. In this case, there will probably be less new technology involved and less scientific terminology that will be unfamiliar to a 1632 reader. For example, the previous entry in the 1911 Encyclopedia Britannica (Indian Mutiny) describes dragoons, artillery, various places in India and so on but lacks words about technology. Even explicitly technological articles are easy so long as the reader either is uninterested in precise details (e.g. the knowledge that vanadium is a metal may be sufficient for getting the gist of an article about steel) or has access to something that provides the interpretation of the necessary details.

Misunderstanding the Basics

Let us consider a short amusing tagline such as might be found in a current affairs magazine or a book on political theory:

"For every action there is an equal and opposite government program."

How is a poor down-timer going to work out what this is about?

To begin with at least three words are going to be confusing.

1. actionhas almost certainly changed its meaning, Cawdrey defines it as "the forme of a suite" which sounds like the definition of a legal action (today we talk about some statement as being "actionable"). Also in French "action" these days can mean a share in a quoted company (i.e. the same as the German AG—Aktiegesellshaft) so it is quite possible that a down-timer will think this refers to a lawsuit or a company share.

2. governmentis a word of misleadingly similar meaning (government is the act or method of governing, it does not mean the bureaucracy, etc., that it does today).

3. programis a word yet to be coined (and in this case one may find misleading meanings in looking at the word in other contexts—"government program" is not the same as "computer program" or "program of events").

Then, once that little difficulty has been taken care of, there is the minor issue of the fact that this is a deliberate misquotation of Newton's third law of motion: "*For every action there is an equal and*

opposite reaction." Quite a lot of the reason why this quip is considered so apposite is that it equates government with the conservation of momentum and the like. Without understanding Newton, even if someone understands the words, there is something lacking. In the 1630's Galileo has just about invented the concept of inertia (which becomes Newton's first law) but the concept of a force and hence the concepts of conservation of momentum in a closed system need a good deal more brain work. Anyone exposed solely to classical Aristotelian laws of motion would utterly miss the point because these laws were (not to put too fine a point on it) wrong.

Newton's Third Law is just one of the thousands of phrases and quips which we expect educated people to be familiar with. There are many others. Just simple slang such as "Frog" for Frenchman or "Limey" for Englishman would be unfamiliar to a seventeenth century reader since they were coined in the eighteenth century.

Phrases That Flummox The Down-timers

A more complex example of a phrase that we take for granted is that "something is the last straw" (see below for where I used it). This phrase "the last straw" is an excellent example of a phrase that will be utterly incomprehensible to a down-timer. In seventeenth- century English there was an expression "*'Tis the last feather that breaks the horse's back*" which has since dropped out of use, replaced by "*The straw that broke the camel's back*" once the latter was coined by Charles Dickens. Dickens' expression has then been then shortened because everyone knows about the camel to being just "the last straw." A seventeenth-century native English speaker might be sufficiently smart to figure out that where they talked about the last feather, twentieth-century English talked about the last straw but I'd be surprised. A seventeenth-century nonnative English speaker is going to look at the phrase, understand every word, and still have no idea what it refers to. Indeed it is quite possible that such a speaker, if he knows about shoemaking will wonder if "last straw" is straw for making lasts (i.e. molds of people's feet) and wonder why twentieth-century Americans used straw when in the seventeenth century they use wood.

The problem gets worse when you involve foreign languages—especially when the foreign language has seen the meaning change. For example people talk about someone mounting a "kamikaze attack" on something or someone else. Unless the context makes it clear what a kamikaze attack is then this phrase is going to be meaningless. If by some mischance the word kamikaze is recognized as being Japanese then this will be a complete "red herring." To the seventeenth-century Japanese the Kamikaze was the wind sent by the gods protecting Japan that sunk and drove off the invading Mongol fleets in the late thirteenth century. There is no idea of suicide or self sacrifice in this meaning whatsoever. Amusingly, it is just possible that a seventeenth-century reader would understand what a "red herring" was since the Oxford English Dictionary quotes this phrase first appearing in print in*The Gentleman's Recreation* by Nicholas Cox in 1686:

The trailing or dragging of a dead Cat, or Fox, (and in case of necessity a Red-Herring) three or four miles . . . and then laying the Dogs on the scent.

Again the joke that "the French have no word for entrepreneur" would be literally true with regards to seventeenth-century France since at that time the root of the word—the verb "entreprendre"—just means to undertake something with all the connotations of risk taking lacking.

Simple phrases that come about because of a technology are going to be not just incomprehensible but inexplicable. Rocket science and rocket scientists are going to be misunderstood because in

seventeenth-century Europe rockets are fireworks, no one has invented the words science or scientist and even once these two concepts have been derived the reason why rocket science is considered so difficult and requiring intellect will not be understood. On the other hand "brain surgery" would be something that a seventeenth-century person might be able to grasp if he were a bright spark but not if he were a few fries short of a Happy Meal.

The Advertisement Problem

Newspapers and magazines were not exactly widespread in the 1630's and the publishing model of today—where the basic costs are met through advertising revenue—was utterly lacking. A person who has never seen an advert is likely to be extremely confused when one interrupts the flow of an article. Ads, moreover, tend to deliberately push the bounds of language as well as of taste. If you are a person who is already struggling, having to get your head around adverts is likely to be the last straw. An ad will probably be both incomprehensible in its own right as a stand alone—what do you think a seventeenth-century person is going to get out of an ad for Viagra with Bob Dole for example?—but may also derail the comprehension of the article surrounding it. Flip through*Time* or*Newsweek* and you'll see ads taking up parts of a page in the same way that "sidebars" and graphs that relate to the article do. How is a person who is struggling with the language anyway going to be able to determine that the advert is irrelevant—especially when the concept of advertising is so missing?

A Worked Example of Incomprehension

What I am doing in this section is subjecting a piece of text to line by line analysis; weblog readers may like to think of this as a seventeenth-century fisking. The text I am using is from the March 22, 1999 issue of*Time* magazine. I'm only picking this because it is on the Internet so we can all read it—http://www.genome.ou.edu/gatesbook.html

Let's start with the title and lead in.

Bill Gates' New Rules

In Business @ the Speed of Thought, Microsoft's chairman says that only managers who master the digital universe will gain competitive advantage

BY BILL GATES

Interestingly @ may be understood almost correctly since its use as an abbreviation for the Latin*ad* (meaning to or towards) derives from medieval monks and was used to represent individual unit cost or weight (e.g. 6 apples @ $1.10 each) in 1536 by a Florentine trader named Francesco Lapi.

On the other hand there are quite a few words where confusion could arise.

Microsoft is not something that looks like a (company) name to seventeenth-century eyes, thus a "smallsoft" could perhaps be assumed to be some kind of cushion.

Chairman might be understood as the carrier of a sedan chair (introduced into London in 1634 but known in France and southern Europe for quite some time earlier). This would almost make sense of the

small cushion.

Digital would probably be assumed to be something to do with fingers or toes.

It is quite possible that business (meaning company or enterprise) and the idea of a manager (as opposed to an owner) would be misunderstood.

If the 1980's were about quality and the 1990's were about re-engineering, then the 2000's will be about velocity. About how quickly business itself will be transacted. About how information access will alter the lifestyle of consumers and their expectations of business. Quality improvements and business-process improvements will occur far faster. When the increase in velocity is great enough, the very nature of business changes.

Even ignoring the words such as "re-engineering" and "lifestyle" the first paragraph is so full of management consultant speak that I predict that it would convey very little meaning to a seventeenth-century reader (arguably it conveys very little to a twenty-first-century one either). The fact that consumers might be thought to be consumptives (i.e. tuberculosis sufferers) is just an additional detail.

To function in the digital age, we have developed a new digital infrastructure. It's like the human nervous system. Companies need to have that same kind of nervous system—the ability to run smoothly and efficiently, to respond quickly to emergencies and opportunities, to quickly get valuable information to the people in the company who need it, the ability to quickly make decisions and interact with customers.

The noun*function* is defined by Cawdrey as "*calling, or charge, or trade, and place wherein a man liueth.*" This is an excellent example of a word that has changed meaning—the fact that it has then been turned into a verb is just the frosting on the cake. Develop is likely to be another word which is only partially comprehended and thought to mean something like unfold or unwrap, that is the opposite of envelope.*Nerves* according to Cawdrey are sinews and*humane* means*"belonging to man, gentle, curteous, bounteous* " thus even if system is understood (it may not be) a human nervous system is not going to be something that is understood.

A company is likely to be understood in terms of a military organization, although, of course, there were also trading companies such as the East India Company or the Muscovy Company. The connection between company and business is likely to be unclear and their relationship with customers, a word which Hakluyt used to mean Customs officials though it may also be used in the twentieth-century sense as well, is almost certain to be misconstrued. Cawdrery defines*decision* as "cutting away," in the context of soldiers interacting with tax gatherers this makes some sort of sense—in the*haakaa päälle* sense that is!

A rough translation of this paragraph might therefore be:

To trade in the age of fingers we have unfolded a new way to make a finger's internal structure. This is

like a bounteous collection of sinews. Groups of soldiers need to have the same collection of sinews. The capability (for soldiers?) to run in a good smooth fashion, to respond to changes good and bad, to quickly get learning about loot to the people in the military group who need to know, the ability to kill revenuers and tax inspectors quickly.

The successful companies of the next decade will be the ones that use digital tools to reinvent the way they work. To make digital information flow an intrinsic part of your company, here are 12 key steps.

Again a rough translation should suffice:

The successful military group of the next ten years will be the ones who use finger tools to reinvent the way they work. To make finger learning liquid an internal part of your regiment here are 12 keys (for feet?)

One could continue but I think I'll stop here as I believe I have made my point. Examining text word by word is an excellent way to produce meaningless or misleading garbage.

Exegesis to the Rescue

So how might exegesis help dispel the vast fog of incomprehension that would face a hypothetical translator of the previous*Time* article?

If the article has been ripped from the magazine (or copied from it just on its own) and there are no other accompanying documents then there will be a lot of problems. The clever English and French scholars who deciphered lost Middle Eastern languages were helped because there was a lot of text for them to study. One reason why no one has yet managed to totally decipher Etruscan is that there are only a handful of tombstones written in Etruscan, however down-timers are unlikely to have just a single article to study; either they will have an entire magazine/book or they will have a series of clippings.

As the various documents are studied some word usage will become clearer. Thus it will become clear that (for example) corporation, company, enterprise and business are frequently synonyms and mean a commercial organization that produces, trades and sells things in a way similar to the aforementioned East India Company. Likewise customers, consumers, decisions, and so on. Even little words such as "key" will be understood as being used in a metaphorical way to mean critical, important etc. so that "key steps," "key points," "key issues" are understood to have nothing to do with locks. On the other hand it is quite possible there will be surprising gaps—the translation of "nerve" as "sinew" may remain because the existence and function of nerves is not known even though derivative expressions such as "nervous" and "getting on someone's nerves" could well be determined from context.

Another simple thing that exegesis can do is identify titles, acronyms and other simple abbreviations. It only takes a single document to write a phrase like "This is a problem facing many Chief Financial Officers (CFOs)" for the whole range of related acronyms be understood as job titles of the form Chief something Officer. Since both Chief and Officer are understandable to determine that anyone who is a Chief something Officer (CxO) is a senior manager within a company. Similarly, seeing a phrase like "companies such as Microsoft Inc., IBM Inc. are facing . . ." will help derive another rule: that Inc.

identifies the previous word or words as a company name. This allows lists of company names to be created and thus when a different article just writes "Microsoft" or "Ford" there is no need to wonder what a "smallsoft" is or what river crossings have to do with motor vehicles.

However, this is just the first stage—it means that words that had some sort of counterpart in the seventeenth century can be translated and that names can be identified as names and possibly classified. The next stage is to start understanding new technologies and concepts. This is probably the main reason for reading these up-time documents but it is considerably more complex. For example, a word such as digital will cause a lot of trouble. "Digital," as used in the late twentieth century, is strongly entangled with computers and telecommunications and these are not technologies that are easily understood. But exegesis will help to elucidate both the meaning and some of the underlying technological concepts.

In order to understand "Digital" it will help to understand "Digit" and this latter is likely to be a simple task. Even when other words in the phrase do not make sense, enough exposure to phrases such as "3 digit area code," "7 digit telephone number" or "5 digit ZIP code" will help explain that digit means the numbers 0,1,2,3,4,5,6,7,8,9. From that it will be possible to determine that "Digital" means "numerical" or "to do with numbers." This will not always help: "Digital Information" could be understood as lists of numbers and "digital communication" the technique of transferring numbers from one place to another. Both are in a strict sense true, but additional exegesis will be needed to determine that this digital includes nonnumeric data encoded as a series of digits. This is a complicated concept and in our universe it was not really developed until the mid to late eighteenth century. However, encryption by substitution is something that is understood so with the right clues the idea of replacing letters with numbers can also be figured out. This may be a case where 1-800 numbers in ads are useful. Quite often the numbers are repeated as both mnemonic text and number such as "1-800-PRODUCT (1-800-776-3828)" and "1-800-BUY THIS (1-800-289-8447)"; enough of these examples will show that that letters A-Z can be mapped to the numbers 2-9 in a consistent manner and this will then lead to the idea that any document can be represented as a stream of digits.

Bibliography

Cawdrey's*Table Alphabeticall* is available on line via Renaissance Electronic Texts at http://www.library.utoronto.ca/www/utel/ret/ret.html. I have created a look up version at http://www.di2.nu/caw1604new.htm.

The 1911*Encyclopedia Britannica* is at http://1911encyclopedia.org/

The story of the @ symbol is at http://www.atsymbol.com/history.htm

A good place for looking up the origin of phrases is "The Phrase Finder"— http://www.phrases.org.uk/

The Koran virgins controversy—http://www.iht.com/articles/532570.html

Bouncing Back:
Bringing Rubber to Grantville

by Iver P. Cooper

Chemistry Professor Joe Schwarcz writes, "It's hard to fight an effective war without rubber. Fan belts, gaskets, gas masks, and tires are critical to the war effort." While he had modern warfare in mind, Grantville's war machines—modified cars and trucks—need rubber to remain functional. In*1633* , Quentin Underwood insisted that "developing a rubber industry should be a top priority."

Rubber has myriad useful properties. Its most unique feature is elasticity, which allows it to be used as a shock absorber. Because of its toughness, articles made of rubber have good abrasion resistance. Rubber is also impermeable to gases and liquids. Finally, it is an electrical insulator. Rubber is used in hundreds of automobile parts; the apt slogan of the B.F. Goodrich Company was, "Everything in Rubber."

* * *

In the old timeline, synthetic rubber accounted for about 60% of all rubber consumed. Synthetic rubber is not an option within, say, a decade or two of the Ring of Fire. Even though we know, from the encyclopedias, that the secret is to co-polymerize butadiene and styrene (or acrylonitrile), where exactly are the butadiene and styrene coming from? Well, we can make butadiene from alcohol, or from petroleum ingredients like butane or butylene. To make styrene, we need ethyl benzene.

Schwarcz comments that the process which the Germans used to make Buna-S rubber (the butadiene-styrene copolymer) "was not a simple business." You need the right catalyst, the right emulsifier, and so on. This detailed process information probably isn't in the Grantville library system.

Even if we knew exactly what to do, to handle the chemicals, we need steel and glass, both of which are going to be expensive to make. And for the raw materials, we have to appropriately process coal or petroleum. All in all, the obstacles are numerous and formidable. Once they are surmounted, the synthetic rubber industry will still have to compete with other industries for key materials (coal tar, petroleum, etc.) and skilled workers.

Prospective Natural Rubber Sources

Our immediate source of rubber will be scrap (see "Rubber Reclaiming," below). However, even with reclaiming, we will eventually run out of rubber. So we need to find natural rubber, and quickly.

Natural rubber is found in latex, a sticky liquid exuded from wounds by certain plants. It is not sap, although non-botanists may confuse the two. There are several encyclopedias available in Grantville, and from them, one can compile a seemingly impressive list (see Appendix 1) of possible rubber sources. However, we need to know where to look and what kind of plant to look for. The best prospects fall into three categories:

(1) New World Tropical Rubber Plants: the Para Rubber Tree/*Hevea brasiliensis*(Amazon and Guianas), the Ceara Rubber Tree/*Manihot glaziovii*(northeast Brazil), and the Castilla Rubber Tree/*Castilla elastica*(Mexico to Peru).

(2) Old World Tropical Rubber Plants: the Lagos Rubber Tree/*Funtumia elastica*(West Africa), the Assam Rubber Tree/*Ficus elastica*(Asia), and various rubber vines (Africa and Asia).

(3) Temperate Latex-Producing Plants included in the Ring of Fire or commonplace in Europe: milkweed and goldenrod in particular.

For each of those rubber sources, we have both a written description, and some kind of useful illustration (its overall form, its leaves, its flowers (if any), its seeds, and so forth).

There are also some borderline prospects: the Pernambuco Rubber Tree/*Hancornia speciosa*, Guayule/*Parthenium argentatum*and Russian dandelion/*Taraxacum kok-saghyz*, which are of interest mainly because they can be grown outside a tropical rainforest. In the case of*Hancornia* and Guayule, the encyclopedias offer only a written description, but there are illustrations and a range map for Guayule in a 1981*National Geographic* article. For Russian dandelion, there is just the prayer (which will be answered) that it resembles the common dandelion.

Knowing Where to Search

The 1911*Encyclopedia Britannica* and the*Encyclopedia Americana* name where wild rubber occurs, by country (e.g., Mexico) or even just by region (e.g., Africa). Obviously, it is more useful to know that it occurs in a small country like Liberia than in a large country like Brazil.

Collier's Encyclopediaand the*World Book Encyclopedia* have maps showing more specifically where wild rubber and plantation rubber are found. There is also useful information in the economic maps of the *Hammond Citation Atlas* . However, these maps must be used with caution.

First of all, they show the*current* range of the rubber trees. The wild rubber may be available, in 1632, from a wider area, and the plantation rubber may be cultivatable in locations other than those shown on the map.

Secondly, they don't distinguish one kind of wild rubber from another, and the ranges do overlap. A given site in the marked region in Africa could be native to the tree*Funtumia elastica* , or to one or more of the many rubber vines which Africa possesses. Likewise,*Castilla elastica* and*Hevea guianensis* are both found in northern South America. So what this means is that*1632* characters should keep an open mind when they look for latex-producing plants.

In any event, knowing where to search is not enough. You have to be able to carry out the search successfully. This has two components: being able to identify the rubber plant (see next section), and being able to survive the journey (see "The Geopolitics of Foreign Rubber," below). The latter section also provides more detailed information on where the plants can be found or cultivated.

Identifying the Rubber Plant

Once we are in the right area, we can hire native guides, show them pictures (and latex or rubber samples), and ask them to guide us to where the trees are located. Or we can stumble around the rainforests ourselves, if we are nervous about the native attitude to European visitors.

Appendix 1 lists the descriptive information that is available for each of the known rubber sources. I am not going to quote the actual text, since it is readily available in libraries or on the internet.

However, I think it fair to warn you that the plant life of the rainforest is very diverse, and it is possible to be deceived by a closely related species that is a poor producer. For example, in Brazil, the leading rubber tree,*Hevea brasiliensis*, may be confused with*Hevea spruceana* (just to complicate matters further, there are interspecies crosses in the coastal regions), and in West Africa, those seeking*Funtumia elastica* may be misled into tapping*Funtumia africana* (the False Rubber Tree).(Polhamus, 36, 65; Christy, 78-9)

* * *

The Aztecs of Mexico and the Maya of the Yucatan and Central America used Castilla rubber for footgear, headgear, game balls, and incense (Shidrowitz, 2-5, 372-3). Because the rubber of this tree was used and even traded by the*indios* of Latin America, we don't actually need to be able to describe the tree in order to locate it. Chances are that if our agents go to the local markets in the correct general area, the Indians will know something about it.

* * *

Another special case is presented by the Indian Rubber Tree,*Ficus elastica* . This is one plant we don't have to journey far to find; it is a popular house plant, and I would be astounded if there were no specimens in Grantville.

The story of how Francois Fresnau found the*Hevea brasiliensis* tree in French Guiana is an interesting one, because the techniques he used could be adapted to finding any rubber tree whose latex production is already known to the natives. Fresnau was quite fortunate to succeed—albeit after a fourteen year search—because*H. brasiliensis*is rare in Guiana. (There is another rubber tree that is more common there, called*Hevea guianensis* , which was identified in 1764). Although he was a military engineer, assigned to the fort of Cayenne, he had been asked to keep his eyes open for exotic plants that might be of interest to the Royal Gardens. Fresnau was especially anxious to find Guianese specimens of the elastic resin-producing Syringe Tree of Portuguese Brazil. However, the natives he bribed with "gewgaws" and gin all told him, "Nimati" ("I don't know").

Then, by chance, Fresnau returned from a fishing trip on a boat crewed by Nauragues Indians from Mayacare in Brazil. He showed them rubber articles, and they immediately realized which tree Fresnau was seeking. Because of his commitments, Fresnau could not travel to Mayacare, but he was resourceful

enough to persuade them to make him*clay models* of the fruit and leaves of the Syringe Tree. He paid the Naurague for their troubles with liquor, salt and other presents.

Fresnau showed the clay models to native hunters and French colonial officials in various parts of Guiana and was told that the trees he sought were to be found on the banks of the Matarani River. He brought his Naurague Indians to the site, and they confirmed that the trees were of the correct species. (Schidrowitz, 14-22)

Rubber Collection Technology

There are two basic techniques of gathering rubber. First of all, we can make a small wound in the bark of the tree, and collect the latex that flows out, without killing off the tree. This is called tapping.

Secondly, we can cut down the rubber tree, or chop up the rubber shrub, vine or weed, and extract all of its rubber content. This may result in a large, quick return, but it is obviously wasteful (especially if the rubber source is a tree with a long maturation period).

Appendix 2 lists the standard collection technologies for each of the rubber sources that were singled out previously as hot prospects, as well as for a few borderline cases. It also gives the expected productivity on a per tree and per acre basis. If land is cheap, and labor expensive, then it may be more important to determine the productivity per tapper.

Rubber Tapping

At least 95% of all of the rubber produced today comes from the latex tubes of the Para Rubber Tree, *Hevea brasiliensis* . There is good reason for this. Latex can be repeatedly extracted from*Hevea* without killing the tree, the latex has a high rubber content, and the rubber itself is of excellent quality. A single tap produces only 56 grams of latex, but the tree can endure 150 tappings in a single year (EA).

The original method of gathering*Hevea* latex was both inefficient and destructive. The tree was nicked repeatedly, and latex bled from the injured areas (Dean, 10). EA says that the tapping that "inevitably resulted had led to the death" of the tapped tree.

Thanks to the work of Henry Ridley in Malaya in 1890-1910, it was recognized that it was better, from the point of view of long-term productivity, to make a single cut, position a cup underneath, and return later to collect the latex. It was also desirable to allow the tree to "rest" periodically. Finally, the cuts must be made with care to avoid the cambium layer. If the latter is penetrated, the trees will toughen their trunks, which will make further tapping more onerous.

If we want our collectors to follow these improved practices—which are described and illustrated in several of the encyclopedias—we will have to go with them to the trees and show them the proper technique. Moreover, if we want to make sure that they adhere to our instructions, we will have to make inspections from time to time.

* * *

In 1911, when the*Encyclopedia Britannica* , 11th ed. (EB11) was published, several different Para Rubber tapping methods were in use, and it was not yet known which would prove to be the best. The oldest was the V-system, in which V's were cut on the base of the tree, and a collection cup placed at

the vertex of each. The width of each V was not more than one-quarter of the circumference of the tree. The V-system can be seen on two of the trees in the photo of Fig. 12.

The V-system had already been largely replaced by the herringbone system, which is depicted in Fig. 2. In essence, there is a central collection channel which leads down to a single collection cup. This main channel is fed by alternating tributaries, diagonals cut at a 45 degree angle.

The third method mentioned in the EB11 is the spiral system, which was then considered to be experimental. It involves making a series of spiral cuts, but the text does not elaborate on where the cuts start and end, how wide they are, how far apart they are spaced, and so forth. We can only judge this from the end result, which can be seen on three of the trees in the photo of Fig. 12. This shows spiral bands of cut bark, separated from each other by an unmarred region which is perhaps one-half to one-third the width of the cut bands. If I understand the system correctly, the cuts will ultimately be extended into this region, too, until the entire lower trunk has been sliced.

The cuts were, whichever the system used, made by means of "small knives and prickers," rather than machetes. In other words, by 1911 it was already recognized that the cuts should be no deeper than the latex-bearing layer.

The modern Hevea tapping method is a derivative of the spiral system; there is a diagram in the*World Book Encyclopedia* (WBE). The tapping of a virgin trunk begins with a single diagonal cut, starting four feet above the ground. It is angled downward, at what looks like a 30 degree angle (this is confirmed by the modern EB), and reaches halfway around the trunk. For the next tap, a parallel groove is cut just below the one before it. As this process continues, a "tapping panel," a diagonal band of scored bark, is created. (The cup is hung at the base of the fresh cut.) After three or four years, the tapping panel reaches the ground, and a new panel is started on the other side of the trunk. By the time this panel is completed, the originally tapped side has healed. For photos of tapping panels, see the modern EB and *Collier's Encyclopedia* (CE).

According to CE, the tapping should begin early in the morning. The WBE mentions that some plantations tap a tree every other day ("1T1R"), while others tap it for 15 consecutive days and then let the tree rest for 15 consecutive days ("15T15R"). CE says that the 15T15R method produces provides much greater amounts of latex than the other.

The*Encyclopedia Americana* (EA) entry provides more information about the cut itself. It is one twenty-fifth of an inch wide, and only one-quarter to one-half inch deep. However, EA suggests a cut that is only one-third, not one-half, the circumference of the trunk; hence, this approach contemplates carving three successive tapping panels into the trunk. In addition, the tapping panels contemplated by EA are only six inches high. (One tapping panel is thus the result of 150 tapping cuts, which presumably occurred over 300 calendar days.)

* * *

The only encyclopedia to provide any information concerning the standard methods of tapping the other rubber trees is EB11, and it must be remembered that the methods it advocates may not be optimal. For collecting the*Castilla elastica* latex, the EB11 recommends a simple spiral cut at a 45 degree angle. The *Funtumia elastica* latex was collected using the "herringbone" system. Pernambuco or Mangabeira Rubber (*Hancornia speciosa*) was obtained by making eight shallow, oblique cuts around the trunk, then allowing the latex to drip into cups.

* * *

The problem with the Ceara rubber tree (*Manihot glaziovii*) is that the latex flows very slowly. Hence, the latex allowed to coagulate on the tree, and the coagulate is then pulled off in strings. Some of the latex will drip down, and large leaves are laid down in advance to collect it. (EB11)

* * *

Tapping methods will affect labor efficiency. For Hevea, just one cut is made per tree per day; a plantation worker can tap 250-400 trees in a day. In contrast, a Castilla must be hacked repeatedly, because the latex-bearing cells are not connected; as a result, the same worker could tap only 20 or 50 Castilla trees daily. (Polhamus 264; Treadwell, 32)

Rubber Harvesting

In some cases, the latex cannot be tapped; the plant must be harvested and the latex recovered from the dead plant material.

If the plant can produce a rubber crop every year, then the main objection to this procedure is the labor cost involved in harvesting. The harvesting of milkweed and goldenrod are discussed below, in their own sections, while guayule and Russian dandelion are relegated to Appendices.

Latex is produced by several different African (and Asian) species of vines. To extract the rubber, the vine must be cut down, and unfortunately, when the price of rubber was high, this encouraged over-exploitation. The EB11 notes that the southern Sudan was "nearly entirely denuded." In consequence, the authorities in the French Sudan, the Congo, and in German Africa adopted regulations which limited when and how the vines could be tapped, and also required replanting. As the EB11 notes, these edicts can only be enforced "at considerable expense."

Library research in Grantville will reveal some information on how to extract the guayule rubber. EA says that 3- to 5- year old shrubs are shredded. The recommended collecting technique is to mow off just the top, so that the same plant can be harvested repeatedly. The latex is leached out of the plant material with hot water.

CE, on the other hand, says that the rubber is found in all parts*except* the leaves. It suggests that the collected plant material be "cured" (that is, left outside to ferment), chopped up, and macerated in water, after which the rubber is skimmed off the surface.

Latex Processing

The latex of the Para Rubber Tree is said to be about 41% rubber and 55% water (EB11); CE says 27%/70% and 36%/60%, respectively, for four and ten year old trees.

Hevea latex can be stabilized by the addition of ammonia or sodium sulfite (CE), and then concentrated (much like separating cream from milk) for shipping. Rubber gloves and toy balloons are made by dipping molds into latex and then allowing the acquired layer to dry. This is usually done several times, to increase the thickness of the rubber, and then the dipped article is removed from the mold. However, most latex is coagulated into rubber at or near the collection site, and only later shaped into a final product.

The Hevea latex is unstable; the rubber will gradually separate from the water, a process called "coagulation." This can be expedited by addition of an acid, since Hevea latex is alkaline. Crude Hevea plantation rubber was typically 94.6% rubber, 2.66% resin, 1.75% protein, 0.14% ash, and 0.85% water.

Grantville's only source of information concerning the handling of latex from other rubber trees is the EB11.

Castilla latex has the advantage that the rubber can be separated from the water by centrifugation. However, the standard processing method is to strain the "milk" through a wire sieve, add an alkaline plant juice (the Castilla latex is acidic) to cause coagulation, flatten out the coagulum to remove water bubbles, and then let the material dry for a few weeks.

In Africa, there was the curious practice of letting the Funtumia latex sit for half a month, covered with palm leaves, in a hollowed-out tree trunk. The trunk absorbs the water component, leaving the rubber behind. Another approach is to dilute the latex with water, and then heat it to coagulate the rubber. The Africans also employ plant-derived coagulating agents, but the bare reference to "Bauhinia leaves" is not likely to be of much use to us.

Perhaps the most important characteristic of Funtumia latex is not mentioned by the Grantville sources; it is very stable (Polhamus, 264). The same is true, to a lesser degree, of Castilla latex (102) and Ficus latex (264).

* * *

A number of natural latexes have a high resin content, and, if the resin is not removed, the rubber will be considered inferior. In 1911, solvent extraction of the resin was considered commercially impracticable, but that of course is very dependent on the price of the solvent as well as on the price difference between high resin and low resin rubber. EB11 shows that Ceara, Castilla and Ficus rubbers have average resin contents of 10.04%, 12.42%, and 11.8%, respectively.

Guayule rubber has a substantially higher resin content. According to CE, it is 20-25% for rubber extracted from the wild shrub, and about 16% in the case of the cultivated varieties. EA gives the resin content as 13-18%. It acknowledges that solvents have been used commercially to extract the resin, but does not provide particulars. The EB11 entry for "resin" says that it is "mostly soluble in alcohol, essential oils, ether and hot fatty oils." Curiously, CE states that the resin content is actually advantageous "as an aid to processing" when guayule rubber is blended with Hevea rubber.

Rubber Processing

A general problem with natural rubbers is the presence, inadvertent or deliberate, of gross impurities (dirt, chips of wood, leaf material, etc.) Such defects can be mitigated by filtering the latex (see above) and by washing the rubber.

The rubber initially conforms to the shape of the collecting cup and is called a*biscuit* . The spongy mass of rubber is washed (with hot or cold water) as it is passed between grooved rollers (EB11, Fig. 8), producing*ribbed sheet* . CE suggests use of a series of rollers, with progressively finer corrugations. It was then hung to dry. If a smokehouse is used, the product is called*smoked sheet* . Or it can be dried without resort to smoking, producing*crepe rubber* . The rubber can be softened with heat and compressed into blocks.

Additional shaping may be carried out in factories. After softening (if necessary), the rubber may be calendered (rolled), molded or extruded. By suitable incorporation of air, sponge and foam rubber can be formed. (WBE)

The rubber is warmed or masticated to soften it. The masticating machine (EB11, fig. 8) kneads the rubber, and, as this is happening, any desired additional ingredients (e.g., sulfur, carbon black, fillers, anti-aging compounds, colors, and oils), are mixed in. The rubber can then be softened further by heat and pressed into molds. One type of masticator, the rubber mill, has two rollers rotating inward, but at slightly different speeds. A more advanced masticator, the Banbury mixer, has rotating blades. (EA)

The last step in the preparation of commercial rubber is vulcanization, since the vulcanized rubber cannot be further shaped. Without this treatment, rubber is an unsatisfactory material; it is brittle when cold and sticky or gooey when hot. Goodyear overcame these problems with his vulcanization process. In vulcanized rubber, the polyisoprene chains are cross-linked by disulfide bonds. Several methods of achieving vulcanization are described in EB11. In one, the rubber is immersed in molten sulfur for an hour or so at 140 deg. C. In another, the rubber is placed in a lead chamber with chloride of sulfur. In a third, it is cooked with a solution of calcium polysulfide at 140 deg. C. The use of excess sulfur or heat results in a hard, inelastic rubber (ebonite).

The Microsoft Encarta CD, which is probably available in Grantville, mentions that vulcanization can be accelerated with aniline and thiocarbanilide.

Rubberized cloth can be prepared by dissolving the rubber in one of its solvents ("carbon bisulphide, benzol and mineral naphtha, carbon tetrachloride, and chloroform") and then using the solution to coat the fabric. The original MacIntosh process used naphtha.

The Logistics of Rubber Collection

Most rubber plants require a tropical climate. Once these plants have been located, we have four choices. First, we can simply trade with the natives for it. Second, we can go out into the hinterland and collect the latex from wild plants ourselves. Third, we can establish local rubber plantations. Finally, we can collect the seed (or other propagatable plant materials) and cultivate the plant elsewhere. This could be at a different tropical location (presumably, one more advantageous to USE), or in greenhouses back home.

All of the high-ranking rubber sources listed at the beginning of this essay have been cultivated, at least on an experimental basis. Most have also been transplanted, at least for trial purposes, to another part of the world, e.g., Hevea, Castilla and Manihot to Asia and Africa, Funtumia to Trinidad (Christy, 237) and Asia (EB11), Guayule to the Soviet Union, and the Russian dandelion to the USA.

However, because Hevea is the most important source of natural rubber, it behooves us to take a closer look at why plantations in Asia and Africa have supplanted the collection of wild rubber in Brazil.

Collecting Wild Hevea Rubber

In our timeline, Brazil was not an important source of rubber after 1920. That is because the British successfully transplanted*Hevea brasiliensis* to Asia. The wild Brazilian rubber was unable to compete with the plantation rubber because its collection was too labor intensive.

There are limits to how much rubber can be collected from wild Hevea trees. They are widely dispersed in the rainforest, usually only two or three trees per hectare (Dean 10). The trees had to be found, and

then connecting paths had to be created by hacking through the dense rainforest vegetation with a machete. Usually, a single tapper would clear two or three trails of 60 to 150 trees each. (Dean, 36-37) The tapper traversed one trail each day. In contrast, on a Hevea plantation, one tapper might process 400 trees in a single day (EA).

Large-scale collection of wild rubber was limited by the labor supply. The Amazon jungles were thinly settled, so workers had to be brought in from elsewhere. These strangers were vulnerable to the many diseases and other pitfalls of life in the Amazon, and labor turnover was high. Even in 1907, "each ton cost five lives" (Dean, 44).

In the lower Amazon, and on the coast, where rubber trees were more accessible, yields declined substantially (from ten to two pounds of rubber per tree per year), as a result of overtapping (Brown, 104). The overtapping was evident by 1853, just eight years after the vulcanization process expanded the rubber market (Coates, 58-9). This forced collectors to go deeper into the Amazon, increasing provisioning costs.

In southeast Asia, plantations reduced labor costs, because a single worker could tap more trees in a day. Logically, the Brazilians should have started their own plantations. Unfortunately, even though it is native to the region, and hence well adapted to the local soil and climate,*Hevea brasiliensis* cannot be successfully cultivated in plantations in Latin America. The Microsoft Encarta Encyclopedia on CD in its "rubber" essay contains these fateful words: "About 99 percent of plantation rubber comes from southeastern Asia. Attempts to establish significant rubber plantations in the tropical zone of the western hemisphere have failed because of widespread tree loss as a result of a leaf blight." (More information about the attempts to establish Hevea plantations in Latin America appears in Appendix 3.)

Even without the South American Leaf Blight, it is doubtful that Brazilian plantations would be competitive with southeast Asian ones. In the early 1900's, the daily cost of labor and provisions in the Orient was perhaps one eighth of that in Brazil (Akers).

Once the demand for rubber outstrips the level that can be produced by wild*Hevea brasiliensis* trees, it will be essential to establish*Hevea* plantations elsewhere, to produce rubber from other botanical sources, or to manufacture rubber synthetically.

The Transplantation of Hevea to Asia

Wickham collected about 70,000 seeds in Brazil in 1876. These were planted at Kew Gardens, but only 2,600 germinated. The seedlings were forwarded to Ceylon and thence distributed elsewhere in Asia.

Some of the sites chosen, such as Calcutta, were poorly suited for*Hevea* . Fortunately, we have the benefit of hindsight; we know roughly where*Hevea* plantations were successful. For example, that map in CE also shows the major producing areas for plantation rubber in India, Ceylon, Burma, Thailand, and the Malaysian-Indonesian region.

It is also extremely important that all attempts to transplant*Hevea* be made strictly with seeds, not with cuttings that might carry abroad the deadly fungus.

Moreover, speed is of the essence. EB11 warns that "the seeds readily lose their vitality," and suggests that they should be "loosely packed in dry soil or charcoal." According to Polhamus (273), in the open, the seeds are only viable for seven to ten days, but packed in charcoal or sawdust, they can be expected to germinate if planted within four to six weeks.

Collecting Other Wild Rubbers

Information is limited (and unavailable in 1632), but Treadwell says that in the British Honduras in the twenties, one man working eleven days in fifty acres of jungle could collect 700 pounds of Castilla rubber.

Rubber Plantation Management

Most of Grantville's information concerning rubber tree cultivation relates to Hevea. EA suggests that the Hevea trees be raised in a nursery for one year, then planted outside in rows about 15 to 20 feet apart. It says that, after casualties from disease, accident, and so forth, there are about 150 trees per acre (see also Brown 104). The trees are mature enough to be tapped when they are five to seven years old; tapping can continue for another thirty to forty years. The older trees are more productive.

It will be found that the trees vary in productivity. This variation can be exploited in a number of ways, including cross-breeding and bud grafting. According to CE, "Bud grafting consists of grafting a dormant bud from a proved high-yielding tree to a seedling one to two years old. After several months the bud forms a healthy bud shoot termed a scion, which grows to form the new tree. The seedling is then cut off just above the bud patch." A photograph shows how the foreign bud has been inserted into a "bark flap."

Hevea has been grown in African and Asian plantations alongside other crops, notably cassava, sesame, ground-nuts, tea, coffee, cocoa and tobacco. The EB11 advises against this interplanting, except in the case of cocoa.

* * *

The first rubber plantation in southeast Asia raised*Ficus elastica* (first planted in 1872), because at that time, before Ridley devised his improved tapping scheme, it yielded more rubber than did*Hevea brasiliensis* (Joshi). The most successful*Ficus elastica* plantations have been in Asia, in the mountainous districts of Assam, Ceylon and Java. (EB11)

* * *

The "Angiosperms" article in the modern EB claims that*Funtumia elastica* has the advantage that it will grow in parts of tropical Africa which are too dry for Hevea. It nonetheless discourages the cultivation of *Funtumia elastica*, declaring that it must be grown for twenty years before commercial yields become obtainable. However, this source is plainly in error; Christy's*African Rubber* provides ample data that Funtumia yields rubber even when it is just five years old, although he recommends that tapping not commence until the next year. It is regrettable that this specialist knowledge will not be available in Grantville, and hence the development of Funtumia plantations in the new timeline may be delayed.

* * *

There is only limited information available to Grantville on the cost of production and, of course, the old timeline data is of limited relevance to the hybrid economy created by the Ring of Fire. For what it is worth, EB11 reports that circa 1911, the cost of Ceylonese plantation production was about one shilling a pound, for a field planted at a density of 150 trees an acre. However, another source (unavailable in Grantville) pegs the Asian (Malaysian) plantation cost somewhat lower; just 0.75 shillings a pound. In

contrast, the cost of Brazilian rubber was four shillings a pound. (Coates, 156)

The price of rubber was then about 2.5 shillings (US$1.25) per pound.

For Castilla plantation rubber harvesting in northern tropical America in the Twenties, Treadwell says that the cost of production was 25 U.S. cents a pound. (32)

The Geopolitics of Foreign Rubber

One of the problems of developing a post-Ring of Fire (RoF) rubber industry was expressed in an aside to readers by Mike Stearns: "the natural resources were halfway around the world under the political control of other nations . . ." (*1633*, Chap. 34)

Even the citizens of nations that are allies in Europe (the English and Dutch in the old time line, "OTL") may take advantage of each other elsewhere. This is an era in which the term "cutthroat competition" is taken literally, and there is "no peace beyond the line" defining the bounds of Europe.

Even if you didn't have to worry about the predatory habits of your fellow humans, there is the question of disease. Up-timers are perturbed enough by the public health conditions of down-time Europe, but the rest of the world is worse off. The mortality rates are three to four times higher in the Indian Ocean area, ten times higher in the American tropics, and fifty times higher in West Africa. (Landes, 170)

The New World

Let us first examine the situation in the New World. The Castilla Rubber Tree grows in "New Spain" (in Mexico and Central America) and in "New Castile" (which includes western South America). All of these regions are claimed by Spain. Legally, there is a ban on immigration, and even trade visits, by foreigners. All transatlantic trade leaves from Seville, takes cargoes of manufactured goods to specified colonial ports (Veracruz in Mexico, Portabello in Panama, and Cartagena in Columbia), and brings gold, silver and other American products back to Seville.

Only a Spaniard can buy a*licencias de toneladas* (the right to ship a certain number of tons of freight on a ship heading out to Spanish America). However, he could be acting as a front man (*testaferro*) for a foreign merchant. A particular kind of*testaferro* was the*cargadore* (the word now means a porter), who actually went on board with the cargo and made sure it was sold for a good price. A foreign merchant could also have a Spanish agent who was a resident of one of the American ports of call for the Spanish trade fleets. Another trick was to sell a foreign ship (with a cargo) to a Spanish figurehead, who would rename it, obtain a sailing license, include it in the Spanish trade fleet, and ultimately sell it back to the original owner (at a price which included a profit on the cargo). (Braudel II, 152-3; Solana) As early as 1608, two-thirds of the shipments to the Indies was of foreign goods (msu.edu).

These practices were geared toward moving foreign manufactures to the Americas, in return for gold and silver. However, a resident*testaferro* could in theory set up a rubber collection program on behalf of a USE customer. The catch, of course, is that there could be no direct supervision by a non-Spaniard.

Mexico, at least, has some degree of native trade in rubber, probably of Yucatan origin. In the sixteenth century, the Aztecs and Maya used it in making footgear, headgear, game balls, and incense (Shidrowitz, 2-5, 372-3). Hence, a local agent could put the word out that he was interested in rubber products, and expect to see some results. The rubber would have to be shipped overland or by "coaster" to Veracruz.

Of course, dealing with*testaferros*— not to mention Spanish officials—is going to cut into your profit margins, and it is conceivable that, once they recognize the military importance of rubber, the Spanish government will take pains to prevent the transfer of rubber from Spain to the USE. (Although Spain and the Netherlands happily traded with each other even while Spain was trying to reconquer the latter, and the special taxes which they imposed on trade with the enemy helped finance the war.)

You have the option of ignoring Spanish law and dealing directly with the Indians (or collecting the rubber yourself). If you are caught, you will likely to be tortured and put to death. So, my advice is, don't get caught.

The secret to success is to travel, preferably in fast, well-armed ships, to areas where the Spanish are weak, and where the natives, if any, are hostile to them.

One such area is the eastern half of the Yucatan peninsula.

Some of the Yucatec Maya have been in a state of revolt since 1610. Moreover, an independent Mayan state still exists in northern Guatemala (it wasn't conquered until 1697).

The southeast portion of the Yucatan is essentially uninhabited. Beginning in 1638, it was infiltrated by British logwood cutters. The Spanish attempted to expel the intruders, but in general were not successful, and the region ultimately became British Honduras (Belize).

Another weak point is the Meskito (Mosquito) Coast of Nicaragua. There are no significant Spanish towns or forts in-between Trujillo (Honduras) and the mouth of the San Juan River (which divides Nicaragua from Costa Rica). In fact, in our timeline, the English established a settlement at Cape Gracias a Dios in 1633, and went on to establish an informal alliance with the local Meskito Indians which endured for two centuries. (Perez-Brignoli, 13, 37, 53; Burns, 209, 362-5)

The USE could collect rubber from the Castilla trees in the Yucatan, British Honduras, northern Guatemala, Nicaragua and eastern Honduras. The Indians can be taught how to tap the rubber, and then we can visit them periodically to collect the material. If hostile forces compel us to engage in a quick in-and-out operation, we fell the trees and save seed for replanting in a more secure locale. We can increase our security by allying with the English Puritans on Providencia Island (about 150 miles off the coast of Nicaragua), and by capturing Jamaica (taken by the English in 1655). (Burns, 202-211)

The latex-producing properties of Castilla lend themselves to hit-and-run operations. A single tree can yield a great deal of latex at one tapping, but it can only be tapped one to three times a year. The specialist literature reports that Mexican bandits could steal a half-year's yield in a night, by surreptitious tapping. (Polhamus, 262)

* * *

While the Castilla tree is the oldest source of natural rubber, the Para Rubber Tree is the most important commercially. How readily can it be exploited by USE entrepreneurs?

Consulting an atlas, you will see that Para is the name of the province in Brazil which includes the mouths of the Amazon. There is also a map in CE which shows sources of wild rubber in South America. If we compare it with a physical map of the continent, it appears that the best places to look are along the banks of the Amazon proper, as well as near certain tributary rivers: the Rio Negro, Japura, Ica, Putumayo, Jurua, Madeira, and Tapajos. (Some of these may actually be sources of other kinds of wild

rubber.)

The difficulties of navigating these waterways is discussed in the EB11 "Amazon" entry, which also calls our attention to "the great india-rubber districts of the Mayutata and lower Beni . . ." It additionally mentions that nineteenth-century rubber traders plied the Negro, the Madeira, and the Purus, that the "finest quality of india-rubber comes from the Acre and Beni districts of Bolivia, especially from the valley of the Acre (or Aquiry) branch of the river Purus," and that 35% of the Amazon Basin rubber is from the province of Para. The rest, presumably, is from the province of Amazonas.

The hazards of this venture are more political than navigational. The Treaty of Tordesillas (1494) sought to avoid conflict between Spain and Portugal in pagan territory, giving most of the Americas to Spain, and reserving Africa, Asia and northeastern Brazil to Portugal. The treaty actually gave the Amazon region to Spain. However, in 1580, the main royal line of Portugal came to an end, and Philip II of Spain became king of Portugal. In consequence, the Spanish rulers allowed the provincial authorities in Lisbon to take responsibility for policing the mouth of the Amazon.

In the late sixteenth century, the Portuguese were preoccupied with northeast Brazil, and the Spanish with Peru and Mexico, permitting the French, Dutch, English and Irish to establish settlements in the lower Amazon (the Dutch at the mouth of the Xingu river, and the English as far as 300 miles upriver). However, in the early seventeenth century, the Portuguese reacted violently to these incursions. They began by establishing the town of Belem, just south of the Amazon, in 1615. Then, during the period 1623-25, they sallied out and destroyed all of the non-Iberian holdings. Even the Catholic intruders were massacred. (Furneaux, 49-51; Smith, 141-2)

A logical question is, why not just send traders to Belem? Unfortunately, this would not be officially tolerated. Prior to 1591, the Portuguese allowed immigration into their colonies by anyone of the Catholic religion. However, after that date, they adopted the Spanish law which excluded all aliens.

Hence, if the USE wishes to trade openly in Belem, or indeed anywhere in Latin America, it must do so through Spanish or Portuguese intermediaries. Spanish agents are fine if you want to use them to arrange shipments of Castilla rubber. However, it is doubtful that they can help you get Para rubber from Brazil. Despite Spanish rule, it is not clear that the Belem authorities will be receptive to Spanish agents.

In 1637, a small Spanish party (two friars and six soldiers), originating in Ecuador,*descended* the Amazon. One friar was sent to Lisbon for questioning, the rest of the party was detained, and later that year Pedro de Teixeira took a force of over 1,000 men upriver, reaching Quito almost a year later. The obvious purpose of this expedition was to strengthen the Portuguese claim to the Amazon Basin. (Smith, 143-8)

Consequently, to set up a quasi-legitimate rubber collecting operation based in Belem, the USE may need to identify the Portuguese equivalent of the Spanish*testaferros* . There are*conversos* (Jews who converted, at least publicly, to Christianity) in Brazil, and the Nasi family may be able to identify possible recruits from this community.

You can avoid this rigmarole if the inhabitants of Belem are willing and able, despite the law, to trade with foreigners. Such illicit trade was common in the Caribbean. The visitors might land a party in a secluded cove, and it would then make surreptitious contact with the locals. They could approach the harbor, and plead that they had been driven off course by a storm. They could "win their market at sword's point"; make a show of force and then, perhaps after real or pretended resistance by the local garrison, receive the governor's license to trade. (The foreigners might even pay duties or license fees.) Or a neglected settlement might welcome them openly, without coercion, as seems to have occurred on

Trinidad in the early 1600s. (Naipaul, 60-70; Burns, 142-6)

Even if the local Portuguese are uncooperative, you may be able to infiltrate the Amazon region. Belem itself is at the mouth of the Para, which lies to the south of the Amazon and is not directly connected to it. Hence, in order to discourage further foreign activities on the Amazon, Portuguese also built a new fort at Gurupa (Furneaux, 50), which overlooks the more southerly of the two main entry channels. Nonetheless, it may be possible to sneak into the Amazon by way of the northerly channel, the Canal do Norte.

The odds are improved if we are forearmed with detailed knowledge of its navigational peculiarities. Grantville's maps of the region are probably not particularly detailed, but Dutch sailors did serve from time to time on Portuguese ships, and may have some knowledge of these waters. Or there may be Portuguese mariners who are sufficiently estranged from their native land (perhaps because it is under Spanish rule) to be willing to guide us through.

Unfortunately, the Para rubber trees do not lend themselves to snatch-and-run operations. While they are prolific latex producers, their wound-healing mechanisms assure that only a small amount of latex is extracted on a given day. Nor has it been found to be productive to fell the trees in order to get a "one time" bonanza. So that means lingering in the Amazon, for weeks or months, until one has collected an adequate cargo of rubber. Which, in turn, increases the risk that native allies of the Portuguese will report your presence, guaranteeing that you have to fight your way back to the ocean.

It is safe to say that it is impossible to establish a USE trading post in the lower Amazon, and supply it on a continuing basis by ships traversing the entrance channels, without either obtaining the permission of the king of Spain, or overwhelming the Portuguese military forces in the region.

While you cannot hope to collect a substantial amount of rubber in the lower Amazon without your presence becoming known to the authorities in Belem, a stealth run could be made for the purpose of collecting seeds. However, we then run up against the problem that Hevea seeds have a very short period of viability. Hence, for such a mission, you really want to have a ship with both sails and steam engines. It enters and leaves the river quietly, under sail, and it steams home. (Ocean steamers can navigate the Amazon as far upriver as Iquitos, 2,300 miles from the ocean.) When Wickham needed to collect Hevea seeds for Britain in 1876, he chartered the steamship*Amazonia* . The "seed raid" is probably impractical prior to the conclusion of the Baltic War.

Another option is to seek out a "back door" into the Amazon basin. The shortest routes are through the Guyanas, the coastal region between Venezuela and Brazil. The stretch separating the mouth of the Orinoco River (Venezuela) and the mouth of the Amazon was known in this period as the "Wild Coast," because of the paucity of European habitation. The Spanish made no effort to settle it, and minimal effort to control it (Hemming, 182-3; Burns, 173).

Of the possible routes, the most interesting one is probably the one exploited in our timeline by the Dutch. Beginning in 1617, they established settlements on the Essequibo River (in British Guyana). They ascended the Essequibo River, then its tributary, the Rupununi, portaged over to the Rio Branco (the Rupununi savannah is flooded over during the rainy season), and then sailed on to the Rio Negro, the Amazon, and the Madeira. Once in the Amazon basin, they traded in iron and slaves. In OTL, the Portuguese eventually blocked this traffic, first with a fort at Manaus (1667), and later with a mission at the mouth of the Rio Branco (1720). (Furneaux, 51; Guyana.org; Burns, 173-6, 196, 214)

The EB11 entry for "Guiana" warns, "The Essequibo can be entered only by craft drawing less than 20 ft. and is navigable for these vessels for not more than 50 m., its subsequent course upwards being

frequently broken by cataracts and rapids." So, if we use this route to trade for rubber, much of the traveling would have to be done by canoes. This would result in much higher transportation costs and longer transportation times than if we could take full advantage of the Amazon River.

There are alternative routes which look shorter on paper, but are less likely to be practicable. For example, one could ascend the Maroni and Litani Rivers (the border between Suriname and French Guyana), and portage over to the Paru or the Jari tributaries of the Amazon, but that requires crossing the Tumucumaque Mountains.

These routes also allow you to play "Johnny Rubber Seed": collect Hevea seeds in the Amazon basin; plant them on your return trip, at a marked location, while they are still viable; and come back four years or so later to collect the seeds from your transplants. Eventually, you will get the seeds to the coast and onto a ship.

It is not strictly necessary to cross the Guyana Highlands into the Amazon Basin in order to find rubber trees; there are some in the Guyanas. These are not the famous*Hevea brasiliensis* , but another Hevea species,*Hevea guianensis* . Hence, USE exploration of the Guyanas could be somewhat improvisational; we try to use the river system to reach the Amazon Basin, but if we find rubber trees along the way, we exploit them.

* * *

The third possible source of natural rubber in the New World is the Ceara Rubber Tree (*Manihot glaziovii*). "Ceara" is the name of a province in northeast Brazil (the part that bulges toward Africa). Ceara was pretty much ignored by Europeans prior to 1649. However, USE exploration in that region could attract the attention of the Dutch and Portuguese, who are struggling for control of the sugar plantations farther south. The plant we are seeking is native to the*sertao* (the arid highlands), and hence may also occur in the hinterland of Rio Grande del Norte, Paraiba, Pernambuco and Bahia (the first two are confirmed by Polhamus, 51). Keep your distance from Bahia and Recife if you don't want to be drawn into the Dutch-Portuguese war.

* * *

We only have a written description of the Pernambuco Rubber Tree (*Hancornia speciosa*), and it occurs in the very region that the Dutch and Portuguese are fighting over. If this rubber enters commerce, it most likely will be the result of their own activity.

* * *

Finally, there is guayule (*Parthenium argentatum*). This occurs in the Chihuahua desert region of Mexico and Texas, and was used during World War II as an emergency source of rubber. This desert is the largest one in North America, covering over 200,000 square miles, and including parts of modern Mexico, Arizona, New Mexico and Texas. There is a map in*Collier's Encyclopedia* (CE) which shows where guayule is found in the wild.

The easiest route into the region is by way of the Rio Grande river. Unfortunately, there are Spanish settlements on the river, at San Juan Bautista and El Paso del Norte, as well as to the south, at Janos, Chihuahua, Parral and Monclova (Spanish Bannon, 4). Hence, the least protected route would be from the northwest, through Apache and Comanche territory. Even to reach that territory, you will have to make a long journey, most likely up the Llano River and then south.

Since you could not expect to make this journey repeatedly without interdiction by Spanish forces, you would mostly like want to do it just to gather seeds and seedlings for transport to a safer region, perhaps one of the Caribbean islands, or somewhere in Africa or in Italy.

Asia

The position of Asia in the natural rubber industry is a curious one. While there are native rubber-producing plants, OTL Asian rubber production is mostly based on the transplanted*Hevea brasiliensis* . The up-timers have a great advantage over their late-nineteenth-century forebears; they know where Hevea production was most successful. The*World Book Encyclopedia* says, "more than 80 percent of the world's natural rubber grows on plantations in the Far East, chiefly in Thailand, Indonesia and Malaysia." Natural rubber-producing regions are mapped by both WBE and CE; they are in rough yet incomplete agreement.

Based on those maps, OTL Thailand has rubber plantations in the valley of the Chao Phraya. The early seventeenth-century Siamese capital was on that river, at Ayudhya (Ayutthaya). Thailand was then a powerful and cosmopolitan kingdom, which traded vigorously, mostly with Portugal, Spain, the Philippines, China and Japan, but also with England, the Netherlands, Denmark, and the Muslim states of the Indian Ocean region. There are no European forts in the Siamese kingdom; Europeans are most likely to be found in Ayudhya or in Pattani, as traders or in the royal service. (Van der Kraan; Polenghi; Thai MFA). While the Europeans may offer us competition, they don't dominate the polities of the Thai state, and hence cannot exclude the USE. As of RoF, Thailand is ruled by an usurper, King Prasat-Thong (1629-1656). Despite the usurpation, Thailand offers sufficient political and economic stability to make it reasonable to establish Hevea rubber plantations there, knowing that the trees will not be tappable for five to seven years. The one problem with Thailand is that it was not densely populated in the 1630s.

The Grantville encyclopedias also reveal that OTL rubber plantations of Malaysia and Indonesia are in the Malay peninsula (southern half), Sumatra, Java, and along the coast of Borneo (principally on the north and west coasts, but there are smaller clusters near Saraminda and Bandjarmasin). Of these regions, the only one which is densely populated is Java. European activity is much greater in this region than in Thailand, as the area receives trade from the Spice Islands (the Moluccas). In 1632, the principal European forts were those of the Portuguese at Malacca (Malaya), the Dutch in Batavia (Java), and the Spanish in Tidore and Ternate(Moluccas). You can expect to run into both Dutch and Portuguese traders pretty much anywhere in Malaysia and Indonesia.

As is apparent from the Grantville maps, rubber can also be grown in south India, Ceylon, Burma, Cambodia, south Vietnam, and the Philippines. The Dutch and Portuguese have major settlements in India and Ceylon, as the Spanish do in the Philippines. The other areas are more open to infiltration by USE.

It is important to note that the Dutch are, at least for the time being, the dominant naval power in both the Indian Ocean and the southeast Asian waters. Before the RoF, the Dutch were in the process of taking control of the spice trade away from the Portuguese, and were ruthless in their treatment of trade rivals. However, since the Dutch are not going to be receiving reinforcements from home any time soon, they are likely to be on the defensive, and low in morale. The second European power of the region, the Portuguese, is likely to reassert itself. Moreover, the English may come back in force, looking for revenge for the 1623 Dutch massacre of the English at Amboina, as well as for profit.

If the USE tries to establish rubber plantations in the Indian subcontinent or in southeast Asia, its agents will need to build fortifications and make alliances, lest they be eliminated (like the English in Amboina in 1623, or the Portuguese in Malacca in 1641). To me, the best bets are in Thailand, in the southern

Malayan state of Johore, in the Mataram kingdom of Java, and in north Borneo, where other Europeans are either relatively weak, or balanced by a strong indigenous power.

Africa

In Africa, the indigenous rubber trees (*Funtumia elastica*) are said to be in central Africa, from "Uganda to Sierra Leone" (EB11). You can get a better idea of where to look by consulting the vegetation map in the*Hammond Citation World Atlas* (I feel it safe to assume that*someone* in Grantville owns a copy.) This shows that there is tropical rainforest in modern-day Senegal, Guinea, Sierra Leone, Liberia, Ivory Coast, Nigeria, Cameroon, Gabon, Congo and Zaire, and light tropical forest in those countries as well as in Uganda. There are also economic maps in that atlas, and they show that rubber is presently grown in Liberia, Nigeria, and the middle reaches of the Congo.

EB11 also reveals that it is possible to cultivate, not only*Funtumia elastica* , but also the Latin American rubber trees, in Africa. The Para and Castilla rubber trees thrive under pretty much the same conditions as*Funtumia* , while the Ceara tree is better suited for drier conditions (compare the *Hammond Citation Atlas* vegetation maps for Brazil and Africa).

If the February, 1948, issue of*National Geographic* can be found in someone's attic or basement, it will reveal the location of the Firestone Para Rubber plantation in Liberia as being mostly within the triangle formed by the modern towns of Careysburg, Kakala and Harbel.

In West Africa, the Europeans don't control large territories. However, they do have forts and trading posts. The principal Portuguese forts are at Elmina, Axim and Chama in Ghana, Sao Salvador, Sao Felipe and Sao Jose in the Congo and Luanda/Sao Paulo in Angola. The Dutch are based in Mouri (Ghana) and the fort of Sao Tome (near Guinea). This would be well-known to the major down-time merchants. My inclination is that if the USE tries to develop a rubber trade in Africa, it will look to Liberia and Nigeria first.

What might be the effect of the rubber industry on the slave trade? It is very likely that if the down-time Europeans outside USE control awake to the advantages of rubber, that they will use African slaves to collect it in the New World. If USE citizens employ foreign factors there, they may unwittingly contribute to this tragedy.

On the other hand, a West African-based rubber industry might serve as a brake on the slave trade, by giving the local chiefs an incentive to keep the available labor force home to grow rubber rather than send it abroad. Besides attempting to grow rubber, we could also have African partners cultivate cocoa, coffee, oil palms, and so forth, and perhaps we could even drill for oil in Nigeria (see Drillers in Doublets).

* * *

Transplanting rubber seeds from one part of the world to another was much practiced in OTL, and has the advantage that the new home may be more congenial for both the plants (escape animals, insects and microorganisms which normally prey upon it) and the planters (lower transportation costs, more easily defended).

The Portuguese, Spanish, and Dutch are certainly able to play this game if they want to produce rubber for themselves. The Portuguese can transplant Hevea seeds from the Amazon to their holdings in Africa and Asia. The Spanish can demand those seeds from their Portuguese subjects, and then plant them in the Philippines. For that matter, they might be able to cultivate guayule in Spain. The Dutch and

Portuguese can establish Manihot or Hancornia plantations in the drier parts of Africa or Asia. Or raise Funtumia in Brazil, or Trinidad (Christy 237).

The main limitation on these competitive activities is a subtle one; it is not worth the trouble of establishing a plantation if you will not be assured of a market for many years. Any down-time government which is astute enough to realize that natural rubber is desirable is also going to realize that at some point Grantville will be producing synthetic rubber. We can certainly play on their fears; they lack the experience in up-time technology which would allow them to estimate how soon synthetic rubber factories would come online.

By the same token, it may not be strictly necessary for us to establish rubber plantations. However, natural rubber is superior to synthetic rubber for tires.

Homegrown Rubber

The USE in 1632 is in a position somewhat like that of Russia during World War II, and therefore has an incentive to look at sources of natural rubber which, while they may not be economical in the long run, are less susceptible to disruption by enemy action.

CE mentions several rubber plants which grow in temperate regions: guayule, goldenrod (studied by Edison, it notes), and Russian dandelion. There is no reference in any of the "rubber" entries to milkweed, but I believe that it is reasonable to assume that Grantville residents would know that it exudes a latex when cut.

Guayule isn't likely to grow in northern Europe, and there are problems with obtaining guayule and Russian dandelion for planting purposes, so I expect that the domestic rubber production, if any, will be based on milkweed or goldenrod.

Milkweed

Over 100 species of milkweed are found in the United States. At least thirteen of them are native to West Virginia. The Monarch is the West Virginia state butterfly, and it lays its eggs on milkweeds. Thus, it is quite likely that milkweeds were actually cultivated in Grantville gardens, before the Ring of Fire, in order to attract Monarchs. But even if that was not the case, we can expect that milkweeds, being hardy and abundant roadside, thicket and pasture plants, accompanied the up-timers on their involuntary voyage to seventeenth-century Thuringia.

How many? We can make an estimate using USDA wild milkweed density data: 0.027 to 0.039/m2 (Maryland), 1.052/m2 (Wisconsin), and 3.604/m2 (Ontario), all for nonagricultural land. If the Ring of Fire had a three mile radius, then that is an area of about 28 square miles, or about 72,500,000 square meters. If half of that area were nonagricultural, with milkweed at the lowest density quoted—0.027—that would still add up to almost 1,000,000 plants.

Milkweeds have several advantages as a source of rubber. First and foremost, they will grow in the USE; we don't have to worry about running overseas milkweed rubber plantations. They are also extremely hardy; well suited for machine harvesting because the stalks grow tall and erect (Whiting, 24); and productive of other useful materials (see below) besides rubber. Finally, their rubber is equivalent in quality to Para rubber.

Their principal disadvantage is their relative low rubber productivity. Also, the rubber cannot be harvested without killing the plant, while Hevea trees can be tapped for several years. This second

disadvantage is somewhat offset by the rapid growth rate of milkweed; the harvested plants will be quickly replaced, certainly by the following year.

The Russians experimented with*A. syriaca* during the Second World War, and they reported an annual yield of 100-150 kilograms of rubber per hectare, from a crop of two tons of leaves. (The rubber content is highest in the leaves, especially mature ones.) The necessary seed was about four to five kilograms per hectare. Of course, the up-timers are going to have to learn all this the hard way.

Because of its relatively low rubber yield, milkweed rubber never became a commercial product. However, the labor costs of producing it are somewhat offset by the possibility of extracting a second useful product from the crop. In 1746, Germans began using the seed hairs (floss) as padding material. In 1918, it was suggested that it could be used as a substitute for kapok, a silky fiber, with excellent buoyancy, used for stuffing and insulation. (Whiting) During World War II, Americans collected 11 million kilograms of pods, filling 1.2 million "Mae West" life jackets (Witt). About 24% of the pod is floss. The reported average annual yield of floss from wild milkweed is, depending on who you ask, 187-349 (Witt), 550 (Whiting) or 1,368 (Duke) kilograms per hectare.

Harvesting the widely scattered wild milkweeds would not be productive. However, we can collect their seeds, and then plant them in rows. Each stalk has four to six seed pods, each pod contains, on average, 220 viable seeds. One hundred seeds weigh about 42-73 milligrams. (DeGooyer) Based on the Russian seeding data, we need about 100,000 seeds per hectare—the seed production of 1,000 stalks. The first plot would probably be an experimental plot where the up-timers experiment with different spacings, seed times, fertilizers, and so on. They would begin production farming in the second year.

The up-timers don't know which parts of the milkweed plant have the highest rubber content, so they will have to find this out by trial and error. The leaves provide more rubber than the stems; yellowing leaves provide more than young leaves, and autumn leaves provide more than spring or summer leaves.

Milkweed latex has a fairly high resin content (perhaps 9-23%). Several methods of recovering the rubber were developed in the old timeline. Kassner treated the latex first with benzene or carbon disulfide, and then with alcohol and caustic lye. After each solvent addition, he distilled. The rubber was the final residue. Hall and Long used boiling acetone, followed by boiling benzene. Students in a modern introductory organic chemistry lab used acetone to extract various impurities and then cyclohexane to extract the rubber. (Whiting, 20-23; Volaric)

None of this will be known in Grantville. Up-timers will probably first try a simple hot water treatment of chopped-up plant material. If they don't like the properties of the rubber, they will probably then just experiment with different solvents until they get results that they like.

Of course, organic solvents are going to be in short supply until we can extract the necessary compounds from coal or oil. The most readily available organic solvents will be ethanol and acetic acid. And any solvent treatment step is going to increase production costs.

It may be possible to cure the resin content problem at its source by breeding milkweed for low resin content (this of course assumes that you have a way of measuring resin content!). I have also come across a hint that in the 1930's, the Russians found a method of chemically treating the plant so that it produced latex with more rubber and less resin. (Whiting, 18)

Goldenrod

Thomas Edison devoted the last four years of his life (1927-31) to an attempt to develop a method of

producing rubber from domestic plants. Edison ultimately settled on the goldenrod, because "it would grow in most parts of the country, it grew to maturity in just one season, and it could be harvested by machines." He increased goldenrod rubber production several-fold by breeding methods, although his technique was not "cutting edge" (Vanderbilt 316) and could certainly be improved upon by a modern breeder with access to a variety of material.

Goldenrods originated in Europe. There are about two dozen species of goldenrods found in the wild in West Virginia, and thus, presumably, in the land transported by the Assiti shard. Since goldenrod is an ornamental plant, there may be additional varieties in Grantville gardens. We can collect the latex from as many different species as we can find, and decide which species is the best rubber producer. Edison preferred*Solidago rugosa* and*Solidago leavenworthii* , but this would not be known in Grantville. Nor will anyone know what to expect in terms of yield, unless someone has an informative Edison biography in his or her personal library. (Edison's results are set forth in Table 2.)

Likewise, it will be necessary to reinvent the methods developed by Edison for harvesting the plants (he wanted to just collect the upper leaves, since they have the highest rubber content) and for recovering the rubber from the latex (he used acetone to pull out the resin, and then benzene or benzol to extract the rubber). The solvents can be recycled. (Baldwin, 398; Vanderbilt, 313)

My thinking is that goldenrod will be grown and harvested primarily as a source of yellow dye, with any rubber production being strictly a bonus. The trick will be to identify a variety that is a good dye source *and* a good latex source.

Rubber Reclaiming

In 1910, when the price of rubber was high, about half of all of the rubber sold was reclaimed. (Reschner)

Rubber is going to be in high demand, and the only immediately available source of rubber is scrap rubber. Since more than half of all modern rubber goes into tires, the latter are also the foremost source of scrap. An automobile tire weighs about twenty pounds. Of this, about 60% is recoverable rubber. (tfhrc.gov). A truck tire weighs twice as much as an automobile tire, and has a proportionate rubber content.

The residents of Grantville are likely to look first at tires that have been discarded or set aside. These may be in dumps, landfills, garages, backyards, and so forth. The rule of thumb is that modern Americans generate scrap rubber at a rate of one passenger tire equivalent per person per year.

Unfortunately, there is a catch. Grantville is based on the real town of Mannington, West Virginia . . . and its dump was not within the Ring of Fire (Boatright,*Grantville Gazette,* Vol. 1). So we have to hope that the GV residents were not efficient about setting out their used tires for pickup.

There may also be small amounts of rubber that can be recovered from rubber goods that are no longer useable for their original purpose. Personally, I think that is going to be a real small supply.

Hence, at a relatively early stage, the USE will need to decide whether to scrap some of the auto tires (figuring that it cannot keep the whole auto fleet running) in order to supply patch material for the heavy tires used in the USE's military vehicles.

At the very least, all the*spare* auto tires in the car trunks can go to the rubber reclaiming plant. If there are around 1,200 cars (Mannington actually has more than that), then that will potentially yield 24,000

pounds of tires, and about 14,000 pounds (seven tons) of somewhat degraded rubber. If we decided to take the working tires off half those cars, that would be another 48,000 pounds of tires, and thus another fourteen tons of secondhand rubber.

One problem is that the Grantville encyclopedias are not very specific about the methods used for rubber reclaiming. EA suggests that the rubber is mechanically reduced to scrap, which is then "heated with steam in the presence of strong chemicals, mainly alkali or acids."

If someone does have the Microsoft Encarta on CD, that gives additional information. It mentions the Chapman Mitchell process, in which hot sulfuric acid is used to destroy tire fabric and restore rubber plasticity, and the Marks "alkaline-recovery process."

In general, the rubber is not going to be restored to its original unvulcanized state, and hence it is more difficult to use. Usually, the reclaimed rubber is used as an extender, together with fresh rubber.

Proposal

Our initial natural rubber industry development strategy should be:

(1) use rubber substitutes (e.g., leather) whenever possible;

(2) conserve and reclaim up-time rubber;

(3) cultivate milkweed at home;

(4) send raiding parties into central America to collect Castilla rubber; and

(5) attempt to reach the Hevea rubber of the Amazon by a back-door route.

Once we have built enough steamships (warships as well as merchant ships) so we can spare a few for extra-European ventures, we should send an expedition-in-force to the Amazon to collect Hevea seeds, and then one to Africa or Asia to establish plantations and collect wild rubber (and rubber tree seeds). Ideally, we would also have sufficient medical resources so as to offer this expedition some protection against the many diseases that hamper seventeenth-century international trade.

If we are allowed to trade freely for wild Brazilian Hevea rubber, and to promote efficient tapping practices, it should satisfy our needs for rubber up until annual world consumption reaches the 30,000 to 40,000 pound range (the peak Brazilian wild rubber production). After that, the development of alternative rubber sources is essential. Hence, at the end of the first decade, we need to decide whether to establish Hevea plantations in Africa or southeast Asia, or to pursue synthetic rubber.

While an investment in the rubber industry is definitely going to qualify as one of USE's riskier commercial ventures, investors can at least be confident that if they are successful, the USE government and private industry will be sitting on their doorstep, anxious to do business.

Table 1: Listed Rubber Sources: Where and How to Find Them

Rubber Plant (Note A)

Range: Range (to extent known in Grantville); Descriptive Material (as available in Grantville (Note B)

Hevea brasiliensis

Para Rubber Tree (major source in OTL)

(Often confused with other producing Hevea species, such as*H. guianensis* ,*H. benthamiana*,*H. pauciflora* ;*H. spruceana* is a poor producer.)

Range:W: South America (EA). Range depicted in CE (probably includes other Hevea species). C: Sri Lanka, Malay Archipelago (EA), Straits Settlements, Malay States, Ceylon, Java, Sumatra, Borneo, Burma, south India, West Africa (especially Gold Coast), Congo, tropical Australia (EB11) Range depicted in CE and WBE. There are reports of*Hevea paucifolia* [sic,*pauciflora*] and*guianensis* in British and French Guiana, respectively (EB9)

Descr:EB11 has 1/4 scale drawing of leaves, fruit and seeds; photo of plantation trees; text. EB9 has scale drawings of leaves, male and female flowers, ripe fruit, and seed.

Manihot glaziovii

Ceara or Manioba Rubber Tree

Range:W: Brazil (EA): Northeast Brazil (EB11). Ceara is province of modern Brazil.

C: Ceylon, India (Madras), West Africa, East Africa, Nyasaland, Mozambique (EB11)

Descr:EB11 has scale drawings of branch with flowers, fruit, seeds; photo of tree; text. EB9 has drawings of tree, young leaf, inflorescence, half-ripe capsule, male and female flowers, seed, and seed section.

Castilla elastica

Panama, Castilla, or Ule Rubber Tree

(Other Castilla species produce rubber, e.g.,*C. ulei*.)

Range:W: tropical America (EA); Costa Rica, Guatemala, Honduras, Mexico, Cuba, Haiti, Panama, Nicaragua and, in South America, west of the Andes, especially Peru (EB11) and Ecuador (EB9). Mexican occurrence depicted in CE.

C: West Indies (esp. Trinidad and Tobago), south India, Ceylon, East and West Africa, Nyasaland (EB11)

Descr:EB11 has scale drawing of leaf, twigs with male and female flowers, seed; photo of tree; text. EB9 has drawings of young leaf, seeds, margin of leaf, female flower. EA has description under "Castilla Rubber Tree."

Ficus elastica

Rambong, Assam or Indian Rubber Tree

Range:W: Southeast Asia (EA); India, Ceylon, Sumatra and Java, Burma, Malay archipelago (EB11)

C: West Africa and Egypt ("but not very successful" in Africa). Also an ornamental in Europe.

Descr:EB11 has scale drawing of leaves on twig; photo; text. EA has description under "Rubber Plant."

Funtumia elastica

Lagos, African or Silk Rubber Tree (F)

Range:W: central regions of east and west Africa (Uganda to Sierra Leone). Range depicted in CE and WBE. C: Gold Coast, south Nigeria.

Descr:EB11 has scale drawing of twig with flowers, underside of leaf, fruit; photo of tree; text.

Rubber Vines (EA, CE, EB11)

Range:W: Africa (EA) Africa and Asia (EB11, see note D below)

Descr:EB11 has scale drawing of twig with flowers, fruit. (For the African*Landolphia owariensis*)

Parthenium argentatum

Guayule (EA, CE, EB11)

Range:W: Mexico and Texas, Chihuahuan Desert (EA). Range depicted in CE.

Descr:text (EA, "Guayule")

Raphionacme utilis Ecanda

Range:W: Portuguese West Africa.

Descr:None, but "Ecanda" may be the native name.

Bleckrodea tonkinensis

Range:W: Tonkin (EB11)

Descr:None, except that it is a large tree.

Hancornia speciosa

The Pernambuco or Mangabeira Rubber Tree,

Range:W: the plateau region (3,000 to 5,000 ft. above sea level), from Pernambuco to Rio de Janeiro, in Brazil. (EB11)

Descr:text.

Sapium species

Range:W: Columbia and Guiana, especially S. jenmani of Guiana (EB11).

Descr:just "large trees resembling Hevea."

Taraxacum kok-saghyz

Russian Dandelion (EA, CE)

Range:W: Turkestan (EA)

Descr:none, but similar to common dandelion.

Solidago

Goldenrod (CE)

Range:Familiar American plant.

Asclepias syriaca

Common Milkweed

Range:Familiar American plant.

Table 2: Productivity of Identifiable Rubber Plants

Rubber Plant (Note A)

Collection: Methods

Density:**(Trees per Acre, Tr/Ac); Age in years to First Tapping (y)**

Yield/Tree: Rubber, pounds per tree per year

Yield/Acre: Rubber, pounds per acre per year (Note C)

Hevea brasiliensis

Para Rubber Tree (major source in OTL). (Often confused with other producing Hevea species, such as *H. guianensis* ,*H. benthamiana*,*H. pauciflora* ;*H. spruceana* is a poor producer.)

Collection:Incision tapping by Ridley method on alternate days (56 g latex per tap)[EA]; V-, herringbone or spiral cuts [EB11], Felling is ineffective for rubber collection.

Density:W: tap at 10-15y [EB11]1 Tr/Ac [Dean10], C: 150 Tr/Ac; tap 6-7y [EB11]; 150 Tr/Ha; tap at 5-7y, productive for 30-40 more yrs. [EA]; 100 Tr/Ac [Enc]; 100 Tr/Ac [WBE];

Yield/Tree:W: 10-15 [EB11]; 2-10 [Dean 10], C1910: 1-2 [EB11]; 0.41-6.76 (6-12 yrs, Malaysia and Ceylon)[Br 126-7]; C1920: 5 [TW301]; CM: 6 [EA]; 4-5 "ordinary" or 12-16 "selected and bud grafted" [CE];

Yield/Acre:W:2-15 [Calc, EB11+Dean], C1900: 382* kg/Ha [EB], C1910: 128-221 (6-7 yr., Malaysia) 105-200 (Ceylon) 105-768 (6-12 yr., combined), [Br126-7] C1940: 342-513* [PH273]; CM: 800-1,000 (avg), 2000+ (top) [EA]; 400-2,000-3,000 [Enc];1,800[WBE]; 798-2,280* [PH273]

Manihot glaziovii

Ceara or Manioba Rubber Tree

Collection:Tapping

Density:tap at 5y [EB11]; 700+ Tr/Ac [PH267]; 320 Tr/Ac [Br150-1]

Yield/Tree:1+ [EB11]

Yield/Acre:C: 88-176 Germ E Africa (5-8 yr.)[Br150-1]

Castilla elastica

Panama, Castilla, or Ule Rubber Tree

(Other Castilla species produce rubber, e.g.,*C. ulei*.)

Collection:Incision tapping [EA]; herringbone or spiral cut [EB11]; or felling [PH16]; 1-4 taps/y [PH102]

Density:tap at 6y [PH109] 8y [PH104]; 50 [PH267] or 100-120 Tr/Ac [PH109]; 400-700[TW32]; 200/Ac [TW279]

Yield/Tree:W:12[PH93]; 40 [EB11](tree killing tap?), C:0.93-1.01* [PH109], 0.1-1.1*/tap [Br222], 0.38-1/tap [TW150], 0.1-0.4 (6-10y)[TW279]; 0.13/tap [TW32], Felled Tr: max 100 [PH16] 51-73* [PH109]; avg 15-20 [TW148]

Yield/Acre:C:50 [TW279]

Ficus elastica

Rambong, Assam or Indian Rubber Tree

Collection:Shredding of leaves and shoots [EA]; tapping [EB11]

Density:50 Tr/Ac [PH267]; tap @10y[EB11], can't tap each yr. [Br233]

Yield/Tree:C: 5-10 [EB11], 0.65-2.3 [Br232]

Yield/Acre:C: 500-1,000 [calc]; but 13-52 [Br232]

Funtumia elastica

Lagos, African or Silk Rubber Tree (F)

Collection:Incision tapping, herringbone [EB11]

Density:tap at 20y [EB]; at 5y [Ch193]; tap 2-3 times/y [Ch161]; tap 1-2/y [Br161], W: up to 150-250 Tr/Ac [Ch36]; C1910: 450-600 [Ch97]

Yield/Tree:Tapped (3/yr) 0.19@5y, 0.56@ 8y, 0.94@10y [Ch161]; ~1/tp [Br176] Felled Tr:0.64 [Ch161] 4.5-6.5[Br176]

Yield/Acre:W: ~150-375 [150-250 x 2-3 *.5] C: ~450-900 [450-600 x 2-3 *.5]

Rubber Vines (EA, CE, EB11)

Collection:Cut stems; or macerate roots or rhizomes in hot water [EB11]

Density:?

Yield/Tree:6-7/Pl [PH40]; 0.06-0.18/Pl [Br197]

Yield/Acre:?

Solidago

Goldenrod (CE)

Collection:harvest and extract resin with acetone and rubber with benzol [PH268]

Density:10-20,000 Pl/Ac [PH268]

Yield/Tree:

Yield/Acre:C: 100 in 1929, >300 in 1934 [Van293-300; Bal398, 411]

Asclepias syriaca

Common Milkweed

Collection:harvest and extract

Density:10-20,000 Pl/Ac [PH268]

Yield/Tree:

Yield/Acre:C1940: 114-171* [Whiting]

Productivity of Trees for Which Description Is Limited

Hancornia speciosa

The Pernambuco or Mangabeira Rubber Tree,

Collection:Incision Tapping (8 oblique cuts all around trunk)[EB11]

Density:

Yield/Tree:

Yield/Acre:

Parthenium argentatum

Guayule (EA, CE, EB11)

Collection:Shredded; leached with hot water [EA]

Density:C: 3-5y [EA];4-5y [Van284]; 5-9y [PH233]; 8,000-16,000 Pl/Ac [PH267];7,000-11,000 Pl/Ac (Van284, 308)

Yield/Tree:

Yield/Acre:C: 137-241 [PH233], 325-400 [Van284]

Taraxacum kok-saghyz

Russian Dandelion (EA, CE)

Collection:Shredded; leached with hot water[EA]

Density:

Yield/Tree:

Yield/Acre:C1940: 285 (Suomela)

Notes to Tables 1 and 2:

(A) With the exception of milkweed, the cited plant names appear in the*Encyclopedia Americana*(EA), the modern*Encyclopedia Britannica* (EB), the Eleventh (EB11) or Ninth (EB9) editions of the *Encyclopedia Britannica* , the*World Book Encyclopedia* (WBE), or*Collier's Encyclopedia* (CE) as sources of rubber.

There are three plants which produce nonelastic rubbers which can be used for insulation, belting, etc. Trees of the genera*Palagium* and*Payena* , found in the Malay Archipelago, produce gutta percha. *Manilkaea bidentata* , found in tropical America, produces balata.*Manilkaea zapota* , the Sapodilla

Tree of Mexico and Central America, produces chicle (mostly used in chewing gum). (EA)

(B) The wild (W) and cultivated (C) range information is primarily from EA and EB11. Info on sites of cultivation includes experimental plantings which may not ultimately have proven successful. Descriptions of the plants are from EB11, unless otherwise stated.

(C) In general, productivity data is not available in Grantville; the one exception is Hevea. The encyclopedia data is cited in the main text. "Enc" is Microsoft Encarta Encyclopedia. The remaining data was collected from various industry sources. "PH" is Polhamus; "Br" is Brown, "Ch" is Christy,"TW" is Treadwell, "Van" is Vanderbilt, "Bal" is Baldwin. W: wild production. C: cultivated. C1910: cultivated production circa 1910. C1940: cultivated production circa 1940. CM: cultivated production in modern times, shortly before ROF. "Tr" means tree, "Pl" means plant. In converting metric to English units, I used 2.5 acres per hectare and 2.2 pounds per kilogram. One kilogram per hectare equates to about 1.14 pounds per acre. Note that productivity is dependent on the location, the age of the tree, the frequency and method of tapping, and so forth.

(D) Various rubber producing vines of the family*Apocynaceae* , especially (1) the genus*Landolphia* , and its species*L. owariensis* ,*L. heudelotii* ,*L. kirkii* and*L. dawei* , in tropical Africa, (2) the genera *Clitandra* and*Carpodinus* in West Africa, (3) the*Forsteronia gracilis* of British Guiana, (4) the *Forsteronia floribunda* of Jamaica, (5) the genera*Willughbeia* and*Leuconitis* of Borneo, (6)*Parmeria glandulifera* of Siam and Borneo, and (7)*Urceola esculenta* and*Cryptostegia grandiflora* of Burma (EB11). Note that EA states that*Cryptostegia grandiflora* is found in Africa.

(E) When guayule is harvested, the plant is usually consumed. Therefore, the annual yield is the nominal yield—the yield in the year of harvest—divided by the harvesting age. Some sources appeared to be reporting the nominal yield, rather than the true annual yield. There has been some experimentation with clipping: harvesting only the part above ground, so the roots can regenerate a new crop. See PH232-3.

References

General Rubber References

cited encyclopedias, see Appendix 1

Brown,*Rubber: Its Sources, Cultivation and Preparation* (1914)

Schidrowitz and Dawson,*History of the Rubber Industry* (1952)

Coates,*The Commerce in Rubber: The First 250 Years* (Oxford Univ. Press: 1987)

Dean,*Brazil and the Struggle for Rubber: A Study in Environmental History* (1987)

Maclaren,*Rubber Tree Book* (1913)

Joshi, "Jungle Rubber"

Mongabay, "A Brief History of Rubber (based on Wade Davis, One River 1996)

Polhamus,*Rubber: Botany, Production and Utilization* (Interscience: 1962)

Polhamus, "Rubber Content of Miscellaneous Plants," USDA/ARS Production Research Report No. 10 (Aug. 1957)(S21.Z2382 no. 10)(USDA 1957)

(specific gravity)

Hildebrand, "Our Most Versatile Vegetable Product,"*National Geographic* (February 1940).

Rubber Reclaiming

Reschner, "Scrap Tire Recycling,"

Para Rubber

Listing of Hevea species and varieties

International Rubber Research and Development Board (IRRDB), "South American Leaf Blight,"

Villard, "Rubber-Cushioned Liberia,"*National Geographic* (February 1948).

Akers,*Rubber Industry in Brazil and Orient*

Loadman, "Sir Henry Alexander Wickham,"

Treadwell,*Possibilities for Para Rubber Production in Northern Tropical America* (1926)

Guayule Rubber References

Ford, "Desert Plant May Put Spring in Natural Rubber Production" (Jan. 2, 2002),

Perry,*Growing Rubber in California* (1946)

Hammond and Polhamus,*Research on Guayule*

Vietmeyer, "Rediscovering America's Forgotten Crops,"*National Geographic* (May 1981).

See also Vanderbilt (under Goldenrod)

Castilla Rubber References

Cokeley, et al., "Fruit Dispersal of Castilla elastica in secondary forest and a developed area of the La

Selva Biological Preserve, Costa Rica"

http://www.woodrow.org/teachers/esi/2000/cr2000/Group_1/Research_Project/Castilla.htm

Treadwell, supra.

Pernambuco Rubber References

IPGRI, "Hancornia speciosa Gomes," in "FRUITS FROM AMERICA: An ethnobotanical inventory"

http://www.ciat.cgiar.org/ipgri/fruits_from_americas/frutales/Ficha%20Hancornia%20speciosa.htm

Goldenrod Rubber References

TrekEarth, "Edison's Lab"

http://www.trekearth.com/gallery/North_America/United_States/photo52079.htm

IEEE Virtual Museum, "High Hopes: Edison's Search for a Rubber Alternative,"

http://www.ieee-virtual-museum.org/collection/event.php?taid=&id=3456957&lid=1

National Park Service, "Goldenrod to Rubber,"

http://www.nps.gov/edis/edisonia/virtual%20tour/chemlab/goldenrod.htm

MSN Encarta, "Thomas Alva Edison,"

Handel, "Thomas Edison Home and Laboratory" (1998)

MSN Encarta, "Edison, Thomas Alva"

see

Vanderbilt,*Thomas Edison, Chemist*

Baldwin,*Edison, Inventing the Century*

Israel,*Edison: A Life of Invention*

Milkweed Rubber References

Whiting, "A Summary of the Literature on Milkweeds (Asclepias spp.) And Their Utilization," USDA

Biblio. Bull. 2 (Oct. 15, 1943)(SB 618 M5 W5)

Volaric, Lisa; Hagen, John P., "The Isolation of Rubber from Milkweed Leaves. An Introductory Organic Chemistry Lab," J. Chem. Educ. 2002 79 91

Beckett, "Rubber Content and Habits of a Second Desert Milkweed (Asclepias Erosa) of Southern California and Arizona"

Witt, M.D. and H.D. Knudsen. "Milkweed cultivation for floss production," in: J. Janick and J.E. Simon (eds.),*New Crops* 428-31 (Wiley, New York. 1993)

Duke, James A.. "Asclepias syriaca,"*Handbook of Energy Crops* (online, 1983)

http://www.hort.purdue.edu/newcrop/duke_energy/Asclepias_syriaca.html

"Chemistry for Kids Summer Camp 2001"

(Ohioan fifth to seventh graders in John Carroll University's "Chemistry for Kids" program studied latex from milkweed and dandelions.)

"Project Science--Ooze Balls Kit"

(includes instructions for extracting latex from Australian dandelions, milkweed*(Asclepias curassavica*), Thistle (*Sonchus oleraceus*), and Rubber bush (*Calotropis procera*))

Schuster, "Plant Study of Milkweed"

DeMarce, Virginia, posting to "Dead Horse: Rubber," 1632 Tech Manual (Nov. 5, 2004)

Boatright, Rick, posting to "Dead Horse: Rubber," 1632 Tech Manual

DeGooyer

http://www.agron.iastate.edu/~weeds/weedbiollibrary/u4milkw1.html

http://www.ars.usda.gov/sites/monarch/sect2_5.html

Dandelion Rubber

Kolachov, "Kok-Saghyz, family 'Compositae,' as a Practical Source of Natural Rubber for the United States,"*National Farm Chemurgic Council Bulletin*(1942).

Whaley, "Russian Dandelion (Kok-Saghyz): An Emergency Source of Natural Rubber,"*USDA Misc.*

Pub. 618 (June 1947).

Suomela,*On the possibilities of growing Taraxacum kok-saghyz in Finland on basis of the investigations conducted in the years 1943-1948* (1950).

IPNI entry for Taraxacum kok-saghyz, available through quotes Acta Instituti Botanici Academicae Scientiarum URSS 1: 137 (1933), "Hab. In montibus Tian-schan, in valle flum. Kegen, 19.X.1931, leg. L. Rodin." Remark 99288.

Plants for a Future Database entry for Taraxacum kok-sahgyz, available through

See also Vanderbilt (under Goldenrod)

Miscellaneous References

USDA Plant Profiles

Schwarcz,*That's the Way the Cookie Crumbles: 62 All-New Commentaries on the Fascinating Chemistry of Everyday Life* (2002)

"Signal Telegraph of the Civil War and the Wire Used,"

Finnish Defense Forces, Quartermaster Depot,

Boschert, Nancy, "Thermoplastic Vulcanizates in Medical Applications,"*Medical Plastics and Biomaterials* (January 1997), online at

Gabriel and Metz, Chap. 6, "Lethality and Casualties,"*A Short History of War*,

(RSR) "Rubber in Steam Railways,"

Rubber consumption figures are from Schidrowitz 332-36, U.S. population from the World Almanac, British population from , car ownership in the US from .

Geopolitics of Rubber

Braudel, Wheels of Commerce, Vol. 2 of Civilization and Capitalism, 15th-18th Century (U. California Press: 1992).

Perez-Brignoli, A Brief History of Central America (U. California Press: 1989)

Smith, Explorers of the Amazon (U. Chicago Press: 1994)

Hemming, The Search for El Dorado (Phoenix: 2001)

Solana, "Dutch Trade with the Spanish West Indies and the Flemish Community in Cadiz in the Eighteenth Century: A Community of Shared Interests?"

Ramerini, "'Dutch Portuguese Colonial History"

and many satellite web pages.

"Colonial Expansion: the V.O.C. ((Dutch) United East India Company) 1602-1798"

"Routes of the Silk Road"

Burns, Alan, History of the British West Indies (George Allen & Unwin: rev. 2d ed., 1965).

"International Commerce and Colonial Spanish America,"

Van der Kraan, "The Dutch in Siam: Jeremias van Vliet and the 1636 Incident at Ayutthaya,"

and "At the Court of King Prasat-Thong: An Early seventeenth Century Account by Jeremias Van Vliet,"

Polenghi, "The Japanese in Ayudhya in the First Half of the Seventeenth Century,"

Thai Ministry of Foreign Affairs, "The Beginning of Relations with European Nations and Japan,"

"Dutch Portuguese Colonial History,"

Landes, The Wealth and Poverty of Nations (19)

Naipaul, The Loss of El Dorado (Alfred A. Knopf, Inc.: 1969)

Bannon, Bolton and the Spanish Borderlands (Univ. Olahoma Press: 1964)

Appendix 1: Grantville Resources

Public and School Library Holdings

"Composites," "Plant," "Rubber," "Dandelion," "Guayule," "Castilla Rubber Tree," "Rubber Plant," Encyclopedia Americana [in Public Library, per search of Mannington Public Library catalog]

"Industries, Chemical Process—Rubber" and "Angiosperms," Encyclopedia Britannica [in Public Library]

"Rubber," "Amazon," "Ceara," "Fortaleza," "Para," "Para (Belem)," Encyclopedia Britannica, 11th ed. (1911), online at

[two copies in Grantville, one donated post-RoF to Public Library, per email from Virginia DeMarce]

"India Rubber," Encyclopedia Britannica, 9th ed. (1875-1889) [in Round Barn]

"Rubber," Collier's Encyclopedia [in Junior High School library, per Rick Boatright]

"Rubber," World Book Encyclopedia [in Senior High School library, per Rick Boatright]

Probable Personal Library Holdings

Hammond Citation Atlas(and other atlases)

"Rubber," Microsoft Encarta CD [per Rick Boatright]

National Geographicmagazines, back to the 1950s at least. [ditto]

Personal Knowledge

While there are no botanists in Grantville, the Up-timer Grid version 6r reports that Susan Lisa Beattie was a horticulture major in college. We don't know where she went to school, but the West Virginia University horticulture program requires 45 hours of agriculture courses. Since she only attended for three years, I would expect that she has taken perhaps two-thirds of that course requirement.

Alden Williams, Sr., Gene Caldwell, Linda Jane Colburn, Fran Genucci, Delia Higgins, Rose Harris (d. 1635), Dora Mobley, Jessica Booth, Deann Whitney, and Vera Hudson are either already master gardeners, or are in the apprenticeship program for that honor. West Virginia Master Gardeners "receive a minimum of 30 hours of instruction. Along with an orientation, volunteers are given core training in plant science, plant propagation, soil science, plant pathology, entomology, communication skills, and integrated pest management." See

And then there are the members of the Garden Club, and, of course, farmers.

While their knowledge is not going to help you find rubber trees or tap them, these people do know how to test soils, plant seeds, use twentieth-century garden and farm equipment, control plant pests, and so forth.

Down-Time Knowledge

The up-time texts are not our only source of information as to where these rubber trees may be found. Down-time scholars may well be aware of texts such as Pietro Martire d'Anghiera's*De Orbo Novo Petri Martyris Anglerii Decades Octo* (1530; translated into English in 1612) which says that trees whose "milky juice . . . congeals to form a sort of pitch-like resin" can be found in the "Valley of Chiribichi."

On the Design, Construction and Maintenance of Wooden Aircraft

by Jerry Hollombe,
Private Pilot (ASEL),
Airframe & Powerplant Mechanic

Introduction

This essay started out to be about what it takes to build an airplane using wood, wire, dope and fabric. It's still about that, but it's also about why there shouldn't be a down-time aerospace industry, nor much of an air force, in the first decade or so post Ring of Fire. I say "shouldn't" because what actually happens is up to the fiction authors and, in my experience, when works of fiction are created, plot and drama trump the details of reality every time. Still, if you're going to break the rules, you should at least know what they are.

I earned my private pilot's license in 1966. At the time, it required a minimum of forty hours flight time. I qualified for my Airframe and Powerplant (A&P) mechanic's license in 1970—one of the very last groups of students to be formally trained in maintaining wooden aircraft. To earn my A&P license I went to school eight hours a day, five days a week, for fourteen months, then passed long and rigorous written and practical exams. Nearly all of what I learned in that time is orthogonal to what a pilot learns. The idea that J. Random Pilot from the twenty-first century would know anything about building and maintaining wooden aircraft is laughable. There were no A&P mechanics in the Ring of Fire—let alone any of my era—so most of what I'm going to talk about below is unknown in Grantville.

Further, as a mechanic I know how to maintain and repair aircraft using mostly off-the-shelf parts and materials. I don't know how to design one. For that you need an aerospace engineer and there is only one in the Ring of Fire, Hal Smith. (Mike Spehar managed to grandfather him in before the Grid became so rigid.) I don't know how to make the precursor chemicals for dope. For that you need a chemist. I don't know how to make the high quality steel to make the wires, nuts, bolts, etc., you need to hold an aircraft together. For that you need a metallurgist. Except in the most general terms, I don't even know how to make a propeller, let alone design one. Trial and error will have to serve.

The following description of the building and maintenance of fabric-covered, wood-framed aircraft is going to include a lot of fiddly details and requirements. Some of them are going to be difficult to implement in the seventeenth century. Whether they are implemented or not is up to the fiction authors, but they should be aware of this:*A lot of airplanes crashed and a lot of people died to put those details and standards in place.* None of them are entirely frivolous. If you want your airplanes to be credibly able to fly from Peetle to Pootle without crashing six times along the way and want your pilots and passengers to be anything but suicidal daredevils, you'll leave them in place. Also note that even

modern private aircraft are inspected annually, commercial aircraft are also inspected every 100 hours of flight and military aircraft are inspected daily, so problems can be detected and repaired early. Finally, when feasible, every pilot does a walk-around inspection of his aircraft before taking it up.

It's been suggested to me that outside of Jesse Wood's air force, down-time pilots will be daredevils. Even if you aren't concerned about their safety, consider the safety of your precious engines, instruments and even rubber tires. You*can't afford* to build airplanes that crash and burn at every pause in the conversation.

So, let's begin.

Tools

First is a list of the*minimum* woodworking tools required to maintain a wood framed aircraft. Most of them should be available or makeable in the seventeenth century. Space limits prevent me from describing each one and its use. Mechanics learn about them in the practical shop part of their training.

Backsaw (14 to 18 teeth per inch)
Small bucking bar
Auger bits
Brace
C-clamps
Parallel wood clamps (Jorgenson)
Scribe compass (10 inch, thumbscrew lock)
Hand drill
Twist drills (1/16 to 1/4 inch)
Flashlight
Hammer
Magnetic tack hammer
Pocket knife
Block plane
Jack plane
Diagonal cutting pliers
Coarse wood rasp (half round)
Fine wood rasp (half round)
Dovetail saw
Crosscut hand saw (10 to 14 teeth per inch)
Keyhole saw
Rip saw (5 to 6 teeth per inch)
Screwdrivers
Combination square
Straightedge (36 to 48 inches)

The wooden frame is covered with fabric and the tools for working with that are the same as those used by a tailor or upholsterer. They include assorted needles, scissors, pinking shears, sewing machines and irons. The fabric, in turn, is covered with dope, which I'll talk more about under the materials heading.

Dope is applied like paint, with brushes or, if available, a paint sprayer.

Even wooden airplanes have metal parts and fittings and for them you need the usual wrenches and screwdrivers and drills (oh my!). To fabricate the parts from raw stock, you'll need the resources of a machine shop or a blacksmith.

In addition to these mostly generic tools, there are specialty tools needed for doing things that only airplanes need done, like tensioning the wires and cables that hold the wings up (and down). I'll mention them as they come up in context.

Materials

Wood

Aircraft spruce is the wood most commonly used for wooden aircraft structures. Properly cured, it is light in weight and has high tensile strength for loads applied parallel to the grain. "Properly cured" means kiln dried to produce uniform strength and reduce moisture content evenly. To promote even curing, pieces to go in the kiln should be as small as feasible, given the parts they are going to be used to make. (Obviously, beams for wing spars and such are going to be pretty long.) If aircraft quality spruce isn't available, certain other woods may be substituted if they are of sufficient quality: Douglas fir, noble fir, Western hemlock and white or Port Orford cedar. Some of these are not available in seventeenth-century Europe.

In general, the wood should be straight grained and the grain should not deviate more than one inch in fifteen. Wood for spars and other large structural parts should be quarter sawed such that the end grain is nearly perpendicular to the sides of the board. The minimum number of annual rings per inch is six for most woods and eight for Port Orford cedar or Douglas fir. Look for trees growing on the shady side of a hill or in other conditions that lead to slow growth.

Aircraft wood must be free of decay, shakes and checks (splits) and compression failures. Minor defects like small, solid knots and wavy grain are tolerable if they don't appreciably weaken the part, but should be avoided if at all possible.

Glue

Most aircraft construction and repair uses glue to join pieces of wood. A glue joint should be as strong as the surrounding wood. Of the glues available in the seventeenth century, animal and fish glues cannot be used for aircraft work because they are not waterproof. Until synthetic resin glues are reinvented, casein glue will have to do. (The familiar white glue is usually a casein glue. It's made from milk, lime and salt.) It is satisfactory for the purpose as long as it is protected from fungus, usually by chemical additives (zinc borate or formaldehyde may be suitable). All glue left over from a job should be discarded.

Fabric

The most common fabric for modern aircraft is grade A mercerized cotton cloth. (Mercerizing is a

chemical treatment that shrinks the material.) Unfortunately, long staple cotton isn't readily available in seventeenth-century Europe, so a substitute must be found.

In the early days of flight, aircraft were covered with Irish linen, which is still acceptable provided it meets quality standards. The main problem with linen is shrinkage. The material must be carefully cut and sewn to allow for that factor or it can tighten up enough to break ribs and damage other aircraft structures.

The minimum tensile strength for the covering fabric is eighty pounds per inch. I.e., a one-inch wide strip of cloth must support at least eighty pounds weight without breaking. It must have a thread count of eighty to eighty-four threads per inch in both length and width and must weigh four ounces or more per square yard. After weaving, the fabric is calendered (pressed wet between hot and cold rollers) to lay the nap.

Fabric may be bias cut (cut diagonally across the weave), which allows a small amount of stretch for fitting purposes.

Surface Tape

Surface tape is used as a reinforcement over stress areas, such as the leading and trailing edges of wings, over rib lacing and seams and around fittings on doped fabric. It is usually cut from the same fabric used to cover the airplane and has identical physical specifications. The tape usually has a pinked (sawtoothed) edge, which improves adhesion and helps inhibit raveling. It should be used to cover all lacing and stitching, but only after the first coat of dope has been applied.

Reinforcing Tape

This is used between the fabric covering a rib and the lacing cord to help distribute load and keep the cord from wearing through the fabric. The material is similar to surface tape, but the warp thread is larger than the fill and it should have a tensile strength of one hundred fifty pounds per half inch. Its width should be matched to the width of the rib it is covering.

Sewing Thread and Cordage

Again, since the customary cotton is not available, linen will have to do.

Machine sewing thread must have a tensile strength of five pounds per strand and weigh about one pound per five thousand yards. It is technically described as white, silk-finish, No. 16 four-cord thread with a left or Z twist.

Hand sewing thread must have a tensile strength of fourteen pounds per strand and weigh one pound per 1650 yards.

Lacing cord is used to attach fabric to the structure of the airplane. It should have a minimum tensile strength of forty pounds single or eighty pounds double. Bee's wax should be used to lightly coat the cord

before use by drawing the cord across a piece of wax.

Waxed cord is used to attach leather chafing strips (made of russet strap leather) on parts of the structure that may be subject to rubbing by moving parts such as brace wires and structural tubing. Chafing strips protect against wear and abrasion and the cord holding them in place must be double-twist and waxed.

Leather

Russet strap leather is used for reinforcing where structural parts or controls must pass through the fabric skin. Horsehide, which is thinner, may be substituted in areas of lesser wear.

Miscellaneous

Tacks are used during construction to temporarily hold fabric in place, but only rustproof tacks, made of brass, tinned iron or Monel, should be used for permanently attaching fabric to wood.

Where holes are necessary for drainage, inspection or lacing, grommets are used to reinforce the fabric. Seaplane or marine grommets are shaped to create suction to enhance drainage or ventilation when necessary.

Dope

In order to make aircraft fabric airtight and weatherproof, dope is applied. Dope also causes the fabric to tighten, removing wrinkles. Caution should be exercised here, as too much tightening can damage underlying structures. Clear and pigmented dopes each have their separate purposes. Modern dope is often pigmented with powdered aluminum to provide protection from sunlight. Aluminum is unknown in the seventeenth century. Until powdered aluminum becomes available, you'll have to live without it and plan extra inspection, maintenance and repair to compensate. Final coats of dope are mixed with color pigments to achieve any desired appearance and also provide some protection from sunlight.

Nitrocellulose dope is made by adding glycol sebacate, ethyl acetate, butyl acetate or butyl alcohol to a solution of nitrocellulose. Ethyl alcohol or benzol can be used to thin the dope to desired consistency. The main drawback of nitrocellulose dope is extreme flammability. Once ignited, it burns too fast for fire fighting to be practical, especially in an aircraft aloft. Adding aluminum, when available, only exacerbates the problem. For reference, the crash of the Hindenburg is now attributed to its having been coated with nitrocellulose dope pigmented with aluminum and iron oxide—a combination better known in modern times as "rocket fuel."

Cellulose acetate butyrate (CAB) dope is more resistant to fire than nitrocellulose and penetrates better as well. On the down side, it has a stronger tautening effect, which can damage fabric or structure if care is not taken. It can be applied over nitrocellulose dope.

If you want to know about the chemicals that make dope. I haven't a clue and never did. It's not in my textbooks. As I said at the outset, I'm a mechanic. I know how to maintain and repair airplanes using

mostly off-the-shelf materials. Dope is something I ordered from a parts catalog.

Modern aircraft coatings also include fiberglass and assorted other plastics, but down-timers are going to have a hard enough time making the traditional dopes without worrying about up-time synthetics.

Construction and Repair

Vocabulary

As with most technical specialties, there is a broad nomenclature for wooden aircraft. It doesn't exist to keep nonexperts at bay, but rather to precisely specify things that must be so specified and don't exist in any other context. So, we must deal with spars, stringers, bulkheads, ribs, formers, longerons and leading edge strips, all of which have definitions unique to wooden airplanes (as opposed to boats and ships). Then there are the assorted struts and wires that hold biplanes and triplanes together, if that's what we're building, each with their own type and name.

Spars are the main beams of the wings and transmit air loads to the fuselage (the body of the plane). They may go from wing tip to wing tip or from wing tip to fuselage and support the ribs, compression struts and various attachment fittings. They can be solid wood, solid laminated wood, or built up into 'I' shapes or boxes.

Ribs give the wing and other airfoils their shape. What that shape should be is an engineering problem. Modern engineers go to a NASA database and look up the airfoil contour that will give them the flight characteristics they desire. Jesse Wood is fortunate that Hal Smith had a book with the standard NACA airfoils in it. Without that, in the seventeenth century, you would have to fall back on the Wright brothers' technique of trial and error, using models in a homemade wind tunnel to test their ideas. However, even without the NACA airfoil book, the up-timers have brought back an understanding of the principles of how airfoils work well beyond the Wrights'.

A properly designed and constructed wooden rib can support thousands of times its own weight when in place on the aircraft.

Leading and trailing edge strips give the ribs sideways support and shape the respective edges of the airfoils. Wing-tip bows shape the outer ends of the wings.

Bulkheads and formers shape the fuselage, or body, of the aircraft. They are held in place by longerons and stringers—wooden strips that run the length of the fuselage.

Carpentry

Most of the actual woodworking is well within the capabilities of down-time craftsmen, given the necessary materials. The ribs are the most complex individual part and they're not all that bad, even though there are a lot of them. The usual technique is to take a copy of the design blueprint and attach it to a flat board, then nail small pieces of wood to it to form a jig for assembling the pieces that form the rib. The ribs themselves are formed from thin strips of wood held together by glue and thin wood gussets. The gussets are usually nailed in place to hold them while the glue dries, but the strength of the rib comes from the glue, not the nails. Just about all the other wooden parts are made using techniques that haven't changed much in centuries.

Metal Work

This gets trickier. There are a*lot* of metal parts in a wooden airplane. Just making the screws, nuts and bolts is going to be a problem in the down-time world, let alone to the standards of strength and consistency flight safety demands. (Remember, you can't just coast over to the side of the road, or even to a stop, if a major part breaks in flight.) In the up-time world, that's done with intense quality control and inspection procedures that use X-rays, Magnaflux™, and fluorescent penetrating dyes, among other things. X-rays probably won't be an option, but, given electricity and wire, Magnafluxing is straightforward. Penetrating dyes may also be possible. Short of this kind of intensive testing, down-time aircraft will be restricted to over-engineering, using bigger stronger and therefore heavier parts than are really required. This results, of course, in a heavier aircraft with poorer performance.

Braided wire cable is also beyond down-time technology for now, so controls and control surfaces are going to be operated by metal pushrods (which are usually tubes) and bell cranks. Bell cranks are simple, pivoting pieces of metal shaped to transfer and redirect the motion of cables and pushrods. They get their name from the crank that converts a straight rope pull to the swinging motion of a church bell. In airplanes, they move the control surfaces, and may also be used for engine controls.

Safety wire is another tricky essential. It's flexible wire, usually made of soft iron or stainless steel, used to secure nuts, bolts and turnbuckles so the vibrations of flight can't loosen them. That means nuts and bolts have to have holes drilled through them for the safety wire to pass through. General purpose safety wire is 0.032 inches in diameter. The holes are barely larger than the diameter of the wire, so they don't compromise the strength of the nut or bolt. Drilling those holes is going to be a challenge to down-time technology. You*need* safety wire and the drilled nuts and bolts that go with it, unless you can you live with pieces falling off your airplane in flight.

In Conclusion

Even if, by a miracle, I was inside the Ring of Fire with all my tools and books and class notes and training and experience still fresh in my head, Grantville still wouldn't know how to build an airplane from scratch, let alone have—or even know of—all the necessary materials. Even ignoring the engineering and design gap, every substitution you make of down-time materials downgrades the safety and reliability of the aircraft and probably its payload as well. For the first 20 years or so after Kittyhawk, it was considered*normal* for an airplane to crash every fifty miles or so.Pilots were daredevils. And they*had* aluminum, steel, cotton, rubber, etc. They just didn't have all the safety regulations and standards in place. (As one of my instructors pointed out, until well after the advent of passenger planes every FAA regulation on the books was put there for the safety of the people*on the ground* . Think about that.) Down-time, it's iffy whether anyone can make safety wire.

During my mechanic's training, we practiced on an old Stearman biplane. As I recall, its maintenance manual came in two volumes, each about three inches thick. Just the procedure for tensioning the wires that held the wings up (and down) took up several pages*and there was only one right way to do it* . Some engineer figured out the procedure. Try any other sequence of installing and tensioning those wires and they would be out of balance, incorrect and unsafe, depriving the aircraft of much of its structural strength. Did I mention the special tool you need to measure the tension of the wires? Also, even then, there was only one company left in the entire country that still made the wires, in case you needed to replace one. I have no idea if they're still in business today. Again, dealing with this sort of issue*might* be

overcome by overengineering, using heavier stronger parts than you really need to so that the aircraft can handle the stresses of down-time construction, but*that would result* , of course, in a heavier aircraft with lower performance.

By the way, once aluminum production comes up to speed, the next thing you need, if you're going to make airplanes with it, is zinc chromate. That's the green primer you may have seen on interior airplane parts, if you've ever seen them at all. Without it, aluminum corrodes and weakens under the vibration and stress of flight and, eventually, pieces start falling off your airplane. How do you make zinc chromate? I have no idea. It comes in cans.

Of course, you're also going to need rivets. Time was I could give you a half hour lecture on rivets alone, covering all the different types, shapes, alloys, purposes, installation procedures, etc. Get back to me about that when Grantville has aluminum.

Note that I haven't even mentioned things like flight instrumentation. How many people even know how an altimeter or air speed indicator works, let alone how to build one? Where are you going to get the down-time expertise to make them to the necessary precision? Do the Grantville machine shops have room in their overbooked schedules to make precision gyroscopes and the associated mechanisms that let them do what a pilot needs them to do? Certainly, no one else down-time has the tools or the skills to do that.

Airplanes—useful, reasonably safe airplanes, anyway—are complicated and difficult to make and they require a lot of industrial infrastructure if they're going to be more than rare curiosities. The time will come when Grantville has that infrastructure in place and airplanes will begin to be common again, but, realistically, that's not going to happen overnight, or even over a year or two.

So, now you have some facts in hand. Go forth and write your tales of down-time aeronautical adventure, ignoring them as you choose. Just don't come to me when pilot and mechanic fans start writing in to tell you what you got wrong. I'll only say, "I told you so."

Mike Spehar, author of the flying scenes in 1633, and creator of Colonel Jesse Woods, head of the USE Air Force in 1633 replies:

In general, I agree and sympathize with the author. It would be an engineering feat of unusual skill and luck to design a successful aircraft from scratch—certainly to the precision that Jerry is familiar with. In focusing on the airframe, Jerry hasn't discussed the problems related to power plant design, especially gearing to the propeller, or how to build a suitable landing gear. The problem of power transfer alone cost me many days of research. I likewise could go on and on about air intake vents and the proper design of exhaust systems. And his comments about suitable wood and fabric brought to mind hours of research of my own on the subject. (Parenthetically, I note that he hasn't mentioned anything about internally braced wooden wing construction. Nor did he discuss the possibilities of incorporating light wood veneer and parquet techniques for wing design, though such things are probably not usually taught in the normal A&P courses.)

But, of course, I cheated. I did include an aeronautical engineer in the Ring of Fire, along with a

professional Air Force pilot with an aero background, as well as thousands of flying hours (as I have). Most of my personal research led me to believe that there are reasonable workarounds to many of the problems Jerry's mentioned, if one can live with a "belt and suspenders" approach to design, generally by making things stronger than they need to be. Naturally, all those workarounds would add weight to the aircraft, but, as the man says, safety first.

There are a couple of technical points that can be addressed from the above:

Re props: Anyone who's looked closely at a WWI prop could probably duplicate one. Our aero engineer would know the basics and the mathematical formulae for wing and prop design aren't rocket science.

Re the construction of instruments: We've mentioned this problem in a number of places, and even discussed some workarounds. I agree it would be difficult, even impossible, to give any aircraft a full suite of instruments. But needle, ball, and airspeed worked for decades. It's not for nothing that we've stressed the dangers of anything but VFR flight. I've several books describing how to build basic instruments, and I suspect Hal Smith would have them as well. And the scientific principles upon which they are based are even better known, but gyroscopic instruments just won't be happening for the foreseeable future.

In a way, this article validates much of what I've posted in the 1632 tech group on Baen's bar about aviation down-time. Whereas some posters have enthusiastically, if unofficially, speculated about fleets of aircraft, I have always maintained that aircraft would be limited to a mere handful throughout the course of the anticipated series of books. I have stretched things quite a bit with the design of the Gustav, but not overly much, I think, given the impetus that wartime priority might create.

I have read some critiques of *1633* complaining about the amount of time and copy I spent on aircraft safety and the nuts and bolts of flying. Since I have, of dramatic necessity, skipped much of the drier bits of aircraft design (as well as skipping the almost unavoidable minor and major accidents), I suppose this article was inevitable. And welcome, I might add, though I would suggest that the author and other critics carefully read the flying bits of *1633* again, to see where I finessed certain problems. I think that he might be surprised at how often I mentioned, or at least alluded to, the problems and dangers of flight.

I could also, I suppose, plead the requirements of dramatic pace for skipping much of what the author has mentioned. I certainly have thousands of words, hundreds of notes, on aircraft construction and flying hazards that I simply never submitted to Eric, though I have kept it all for future reference. In one e-mail to Eric, I recall describing the high mortality rate of early pilots, as well as describing, at considerable length, the usual way in which VFR pilots kill themselves in sudden IFR conditions. I believe he used two sentences of that thoughtful exposition in the book and rightly so. Likewise, I suppose I could mention that any such story requires that certain "willing suspension of disbelief." But I won't. I'm a firm believer in the principle that any technical detail integral to the story should be based on hard fact, with as few flights of fancy as can be managed. Failing that, the technical details should at least sound logical, if a few preliminary assumptions are swallowed. Beyond that, I long ago decided that the proper response to any real expert's corrections was to plead guilty—and to add him or her in my list of useful contacts!

All in all, I congratulate Jerry on his incisive article, though I warn him to be prepared for a hailstorm of posts to answer from various Barflies!

V/r, Mike Spehar

The Jews of 1632

by Douglas W. Jones

Foreword

With Jewish characters occupying such a prominent place in the *1632* story universe, it is important to accurately recreate the Jews of that era. What I have written in the following is intended as a handy resource for anyone contemplating using Jewish characters in fiction they set in this world. I have tried to cover issues that would matter most to a writer trying to invent realistic Jewish characters without more than a cursory glance at matters of theology, except as these would be seen by an outsider observing the Jews of the era. The one exception to this is in the area of *Kaballah* , where I have delved deeper because this was at the center of the largest controversy in the Jewish world of the era.

In writing what follows, I have tried to consistently transliterate Hebrew words into English using natural spellings of the Ashkenazic pronunciation, since this was the dominant pronunciation in Germany in the seventeenth century. By way of example, consider the word Sabbath, pronounced *Shabbos* by most Ashkenazic Jews, with the emphasis on the first syllable. In contrast, Sephardic Jews pronounce this as *Shabbat* , with the emphasis on the second syllable.

Most modern transliterations from the Hebrew follow the Sephardic pronunciation because that is how modern Israeli Hebrew is pronounced. I will not use any of the standard Hebrew to English transliteration schemes that are used in scholarly work. Some of these use diacritical marks unfamiliar to most readers, while others generate bizarre spellings that don't suggest any widely spoken dialect of post-biblical Hebrew. For example, rendering Sabbath as *Shabboth* .

Unfortunately, there is no one-to-one correspondence between the letters of the English alphabet and the Hebrew *aleph-beis* . There is one Hebrew letter that can be pronounced as either *b* or *v* , so the name Abrabanel and Abravanel are both reasonable transliterations of the same Hebrew spelling. Similarly, another letter can be pronounced either *s* or *sh* . In both cases, there are diacritical marks that can be used in the Hebrew to indicate the intended pronunciation, but these are omitted in most written Hebrew.

The glottal *ch* sound found in many Hebrew words has no English analog. This is used in the words *chiam* and *bruchah* , meaning respectively *life* and *blessing* , and pronounced as the *ch* in *Bach* or *Loch Ness* . It should be easy for Germans and Scots to pronounce, but it gives many English speakers trouble. Some transliterations use the letter *h* for this sound, others use the awkward looking *kh* ; given that English readers expect to see *ch* used for this sound in loan words from Gaelic and German, it is hard to justify these other alternatives.

A final reason for irregular transliterations from Hebrew to English lies in places where both Hebrew and English grammar can be used. Should we construct the plural of *mitzvah* , commandment, as *mitzvahs* , following the English rules for plural formation, or should we construct the plural as *mitzvos* or *mitzvot* , using the Hebrew rules for plural formation? I will do the latter because it demonstrates how a Jewish character would say the word where a writer might want to emphasize their Jewishness by having them drop in an occasional Hebrew word. I recommend doing this in careful moderation except where you want your Jewish characters to come across as incomprehensible.

In the context of remarks in the novel *1632* about the American habit of using acronyms, it is relevant to note that the Jewish world has been using acronyms for a very long time. The Jewish Bible is known as

the Tanach, formed from the initials for*T* orah,*nevi'im* (prophets) and*ketuvim* (writings), with random vowels added to allow it to be pronounced as a word. Similarly,*stam* calligraphy is used for the texts of the*Sefir Torah* ,*tefilin* and*mezuzot* . Many more of these acronyms will be mentioned later, in the section on Jewish names.

Judaism: A Brief Introduction

Judaism centers on the covenantal obligation of Jews to perform the 613 divine*mitzvos* that have been identified in the Torah, the first five books of the Bible. As a result, Judaism has, at its core, a code of law known as*halacha* , a word meaning "the path." It is reasonable to compare this to the canon law of the Church, but where Christianity is a matter of faith and can survive without its law code, it is difficult to formulate versions of Judaism that are not centered on the*mitzvos* .

Jewish law was considered to be binding on all Jews, and throughout most of the European Jewish world of the seventeenth century, Jewish courts were empowered by the Christian authorities to enforce this code of law in all disputes between Jews.*Halacha* is not just a religious code, for example, it includes a highly developed code of commercial law, and matters of doctrine or creed are not addressed in any depth.

The two primary jobs of a rabbi have traditionally been to serve as a teacher and a judge of Jewish law. It follows that the Talmud, which is the central text of every rabbinical seminary or*yeshivah* , can be thought of as a law text—although it is much more than that. The Talmud is massive and must be studied in the context of more recent rabbinic rulings. As a result, shorter codes of Jewish law have long attracted readers. In the seventeenth century, the*Shulchan Aruch* by Rabbi Yosef Karo of Safed was the newest compendium, but it was also somewhat controversial.

Under Jewish law, all prohibitions can be suspended when doing so will save a life, excepting the prohibitions against murder, idolatry and sexual immorality. Dietary prohibitions and modesty rules fall by the wayside if they stand in the way of saving a life, as do the prohibited categories of work on the Sabbath and even the laws against theft. In times and places where Jews were subject to serious persecution, many Jews interpreted the obligation to save lives narrowly, applying it primarily to Jewish life.

The Jewish world of 1632 was a complex one; broadly speaking, it was divided between the Ashkenazic and Sephardic communities, but this greatly oversimplifies the picture. The Jews of Italy, in particular, included an indigenous community dating back to Roman times that was neither Ashkenazic nor Sephardic. This community had its own ritual tradition dating back to Roman times, although by the seventeenth century Italy also hosted Ashkenazic and Sephardic communities, most notably in Venice. The Babylonian and Yeminite communities were also distinct.

In general, the division between the different Jewish communities was not one of ideological disagreement, but one of traditions. The Jews of these communities usually agreed that the traditions of the other communities were valid and that, within each community, these traditions had the binding force of law. The greatest differences between these communities were in the prayer book, where one community or the other had made additions to the basic structure of the liturgy mandated by the Talmud, and in minor dietary laws—particularly those surrounding Passover.

In addition to the traditional and ritual differences between the Ashkenazic and Sephardic communities, there was significant prejudice. Sephardic Jews still remembered being at the center of the Jewish world

prior to their expulsion from Spain, and tended to think of their Ashkenazic cousins as uncultured and vulgar. Ashkenazic Jews, in turn, resented this dismissive attitude.

There was also, of course, the matter of language. The*mamaloschen* (mother tongue) of the Ashkenazic community was Judische Deutsch, formed from German with a liberal admixture of Hebrew roots (*laschon*is, for example, the Hebrew word for tongue). In seventeenth-century Poland, Judische Deutsch was already well on the road to becoming what we now call Yiddish. In areas where the larger community spoke various local German dialects, it is not clear that Judische Deutsch should be described as Yiddish, and considered as a distinct language, as opposed to just another German dialect. The Sephardic community, in contrast, spoke Ladino, or Judaeo-Spanish, while the Italian community spoke Judaeo-Italian. There was also an indigenous Jewish community in North Africa that spoke Judaeo-Arabic.

All of these languages contained numerous Hebrew words and were written in Hebrew characters. It is fair to say that these languages were mutually incomprehensible with the possible exception of slowly spoken and carefully enunciated Judaeo-Italian and Judaeo-Spanish. Rabbis, many laymen and some women in all of these communities would have known enough Hebrew to overcome any communication difficulties caused by these language differences.

As already noted, the Ashkenazic and Sephardic communities had distinct Hebrew dialects. In Ashkenazic, the*th* sound had become an*s* , so Ruth was pronounced*Roos* , and in Sephardic, it had become a t, so the name became*Root* . There was also a shift in the pronunciation of some vowels and a shift in syllable emphasis. Where Sephardic Jews generally emphasized the last syllable, as in*talit* or*amen* , Ashkenazic Jews tended to emphasize the first syllable,*talus* or*omain* .

Jewish names

Family names, as we know them today, were uncommon in the seventeenth-century Jewish community. From biblical times to the modern era, all Jews generally have patronymic names, so*Moische ben Aaron* is Moses, the son of Aaron, and*Frumah bat Yosef* is Faith, the daughter of Joseph. Jewish marriage, divorce and death records will always give the name in this form, as will Jewish court records. In addition, this form of name is used when a Jew is called up in the synagogue for any liturgical purpose.

There is one general exception to this, the family names*Cohen* and*Levi* , which are of biblical origin. The name*Cohen* , indicating priestly descent, has numerous variants, including*Kahn* and*Kaplan* . In the same way,*Levi* indicates descent from the biblical Levites and gave us family names such as*Levine* . In formal liturgical usage, these names are appended to the patronymic form, so Samuel son of Moses the Cohen would be known as*Schmuel ben Moische haCohain* . When the Torah is read in the synagogue, the first and second sections of the reading are reserved for the Cohen and Levite, if any are present. This and a few other minor ritual privileges have ensured the continuity of these family names.

In the seventeenth century, a few Jewish families were using family names approximately as we use them today. Most frequently, these were used as a way of calling attention to relationships with prominent ancestors. For example, many descendants of the noted French Torah commentator and mathematician Gershonides, or Rabbi Levi ben Gershon used the family name*Ralbag* to call attention to their ancestry; Ralbag was simply the acronym for his full name.

Most of the great Jewish scholars have had their names reduced to acronyms. For example, the eleventh century French biblical commentator from Troyes known as*Rashi* was Rabbi Shlomo ben Yitzach, and

the greatest scholar of the twelfth century was the*Rambam* , Rabbi Moshe ben Maimon of Cairo, known in the Christian world as Maimonides. Aside from*Ralbag* , however, these acronymic names did not generally become family names.

It was common to use the name of a home town as a last name. For example, the merchant and Talmudist Simon ben Eliezer was known as Simon Günzburg after his birthplace; he lived in Ulm for a while and was also known as Simon Ulma. He was famous enough that his descendants carried on both of these names as family names, giving rise to the modern names Günzburg and Ginsberg as well as Ulma and Ulman.

When someone had an extremely common name, for example, Yehudah ben Avraham, there was a need to distinguish them from others with the same name. The most prominent person with such a name in any given community generally got to keep the name, while others needed to add something. The Abravanel family, for example, is probably descended from a prominent resident of Seville named ben Avraham; other ben Avrahams from Seville would have had to use a different name. The question of whether it should be transliterated Abravanel or Abrabanel is fair. The former transliteration is more common, but because the letter*v* is pronounced more like an*f* in German, the latter transliteration would be more likely in German lands.

In the mid-seventeenth century, Rabbi Schlomo ben Yitzach of Frankfurt had a very common name. There were many Solomons who were sons of people named Isaac. To distinguish him from others of that name, he was sometimes called Solomon Rothschild. The name Rothschild, in turn, was used because his father Isaac, the leader of the Frankfurt Jewish community, lived in a house with a red shield hanging over the door. These shields were put up in the Frankfurt Jewish quarter in the early 1600's at the insistence of the Christian authorities. At the time, the name Rothschild had no special meaning, and in fact, Schlomo ben Yitzach also called himself Solomon Bacharach and would probably have preferred that name if the Christian authorities had not imposed the name Rothschild. His descendants, on the other hand, continue to take pride in the name Rothschild to this day.

Nicknames were common in the Jewish world of the seventeenth century, and it was common for Jews to go under variant names in different circles. Yitzach of Frankfurt, for example, was probably Isaac Frankfurter to his Christian neighbors. To his close friends and colleagues, he was probably Yitz. In German, if you could address him informally in German as*du* , you would call him Yitz; if you had to address him formally, with*Sie* , he would be Yitzach. To his wife or mother, he might have been Yitzelle (little Yitz).

Names in translation also occurred. The name*Chiam* became Vidal in Judeo-Italian and Ladino because it means*life* . The names*Tzvi* and*Ari* , meaning deer and lion, became*Hirsch* and*Loew* in Judische Deutsch. The name Loew became a family name as early as the fifteenth century. Rabbi Yaakov Loew ben Chiam, born around 1480, was*Reichsrabbiner* or chief rabbi of the German Jews. The most famous member of this family was the*Maharal* , Rabbi Judah Loew ben Bezalel of Prague (1525-1609). Today, the*Maharal* is remembered as the creator of the Golem of Prague; this legend may have been unknown in the mid seventeenth century but his work on whether it was permissible to use automatic mechanisms to do work on*Shabbos* was fairly well known.

The master of the house,*baal beis* in Hebrew, was known as the*balebus* in Judische Deutsch. Any familiar but also highly respected man was likely to be addressed as*Reb* , used as a title of respect, but only with his first name. The honorific*Reb* is close in value to Mister, as it was used in the nineteenth century, which is to say, as a title for the master of the household; any*balebus* was therefore entitled to this honorific. The honorific*Rav* was appropriate for rabbis only, and the wife of the rabbi would be the *Rebitzin* . Tradition discouraged unmarried men from serving as rabbis.

Women of the seventeenth-century Jewish community sometimes had Hebrew names but in other cases, they had German or distinctly Judische Deutsch names. The*Maharal's* children included Gitele, Tilla, Rachel, Leah, Vögele and Realina. Some biblical names, such as Eve or Rebecca would rarely be heard in their German form, but rather, they would be pronounced in their Hebrew form,*Chava* and*Rivka* except in dealings with non Jews.

Jews and Gentiles

The laws governing the Jews of seventeenth-century Europe encouraged them to support themselves through the loan business. In exchange for being allowed this one source of income, Jews were forced to pay special taxes. In areas with significant Jewish populations, these "Jew taxes" were a major source of income. For the nobility, raising the Jew taxes and having the Jews pass these on as high interest rates was a safe way of squeezing money out of the their subjects because borrowers generally directed their anger at the Jews for the high interest rates instead of blaming the government.

The Jews of the seventeenth century generally lived within walking distance of synagogues because of restrictions on the distance a person could travel on the Sabbath and a prohibition on riding on the Sabbath. When possible, Jews lived in walled and gated compounds within towns and cities; Jewish law encourages this because the prohibitions on carrying on the Sabbath relax considerably if you are within a walled area, called an*eruv* , although the city walls themselves would suffice.

Christian law, based on the papal bull of 1555, required that all Jews living under Christian rule live in the Jewish quarters of their towns and required that the gates to the Jewish quarter be closed on Sunday, lest the Jews spoil the Christian Sabbath. The gated Jewish quarter provided some protection from mob violence directed against Jews, particularly around Easter when attacks against Jews were common enough to be described as traditional.

The term ghetto itself was relatively new in the 1630's, dating only to 1516, when the principality of Venice restricted Jewish residence to an area formerly occupied by a foundry, or*ghetto* , in Venetian Italian. Many German towns had Jewish districts organized along a single long street; in most such towns, the district was known as the*Judengasse* —Jewish lane. The most famous*Judengasse* was that of Frankfurt am Main.

Despite papal and imperial decrees that all Jews be confined to the Jewish quarters of towns, there were Jews living outside these quarters. Such Jews were known as*Shutzjuden* , or protected Jews, and they lived outside the Jewish quarters only because they paid*Shutzgeld* , protection money, to the local noble. In effect, this*Shutzgeld* was a bribe to the noble in his role as magistrate to have him overlook the decrees he was legally charged to enforce. By the seventeenth century, status as a protected Jew was generally governed by a contract that could be inherited. In some areas,*Shutzgeld* was a major source of income to the local nobility.

Jewish commerce with non-Jews was strictly limited. Jews were forbidden to sell new goods, join guilds, bear arms or hold public office. Aside from money lending, the only other businesses generally permitted were trading in used goods such as scrap and rags.

In the seventeenth century, the restrictions on Jewish occupations began to soften. Jews had to be careful about this, carefully constructing legal fictions in order to bend the rules. For example, where a Jew could not legally buy and then resell some product, he might legally act as a broker, taking delivery

of the product from the seller, delivering it to the buyer and taking care of the cash transfer for a fee. Restrictions on Jewish commerce were generally more likely to be enforced in areas with significant Jewish populations; they were weak where Jews were few and far between.

The word "gentile" itself is worthy of note. In the Jewish world, the term used would invariably have been*goy* , or*goyim* in the plural. In Hebrew, this word means exactly the same thing as the Latin*gens* , a race, a people or a nation. As used in Judische Deutsch, the word*goy* became a synonym for gentile; it only had negative connotations because, until recent times, it was a safe assumption that if a person was a Gentile, he was likely to be anti-Jewish and therefore dangerous. Jews did trust some Gentiles, but such trust was rare, conditional, and risky. All Jews were generally familiar with stories about Gentiles who had proven themselves to be trustworthy through many years and then had betrayed that trust.

One story, in particular, illustrates the risks of such trust. Over the centuries, there have been many churchmen who extended considerable protection to the Jews, only to withdraw it. Martin Luther is the most famous example; early in his career, he urged that Jews be treated with great respect, but once he concluded that such tolerance would not convince large numbers of Jews to convert to Christianity, he wrote*On the Jews and their Lies* (1543), one of the most anti-Semitic works ever written. Luther went so far as to say "We are at fault in not slaying them." As a result of this change, the Jewish communities of many of the new Lutheran lands faced persecution so severe that essentially all of the Jews were driven out.

Of course, the term "anti-Semite" would be entirely unfamiliar to any resident of the seventeenth century. It is a nineteenth-century term, coined by Wilhelm Marr when he wanted a respectable and scientific sounding term for the older*Judenhass* —literally, "Jew hatred."

In general, when Jews and Christians interacted, there was a very strong asymmetry. Christians were urged by their tradition to do everything they could to convert Jews, while Jews were urged by their tradition not to talk about Judaism to non-Jews. For the past thousand years, the experience of the Jewish community with such dialogue had been extremely negative. The Catholic Church had organized many disputations in which Jewish and Christian scholars were pitted against each other, but the outcome of these disputations was generally preordained and frequently fatal for the Jewish participant. As a result, genuine interfaith dialogue was extremely rare and when it occurred, it was almost always conducted in private.

In the context of*1632* , for example, it is quite likely that Rebecca Abrabanel would have been quite reluctant to say much about the depth of her own allegiance to Judaism to Michael Stearns for several years after she married him. He might not even notice small observances she maintains while living with him, and when he does, he may completely misunderstand their significance.

Jewish Dress

In general, in every age, Jews have dressed more or less like their neighbors. Examination of medieval illuminated manuscripts makes this quite clear, as does examination of the works of several seventeenth-century artists. There are, however, some distinctively Jewish elements to clothing.

The first of these is the response to the commandment to wear "tassels on the corners of your garments" (Numbers 15:37). This has led to the universal Jewish custom of men wearing a*tallus* or prayer shawl during morning prayers. In the Sephardic dialect, this was pronounced*tallit* . Medieval persecution and pietism combined to lead Jews of the medieval Ashkenazic community to convert this to an undergarment

that could be worn all day without being obvious. The big*tallus*—*gadol* was still worn during morning prayers. Only the four*tzitzis* , or tassels of the little*tallus katan* undergarment hung out into public view. To any Jew or to any Gentile who came in regular contact with Jews, these fringes served as a badge that the wearer was Jewish. German Jews frequently referred to the*talus katan* undergarment as a*tzitzis* , after the fringes it carried.

By the seventeenth century, the Ashkenazic tradition was that all men, starting in*cheder* or elementary school, wore*tzitzis* , but only married men wore the*tallus gadol* . The story in the Sephardic world is less clear; Jews in the Ottoman Empire were wearing the*talit katan* , but it is difficult to identify evidence that the Sephardic Jews of Amsterdam wore this undergarment. Certainly, "secret Jews" living in Spain or Portugal would be risking their lives to wear such a garment.

In 1434, imperial law required German Jews to wear a Jew badge, in keeping with the papal bull of 1425. The requirement that Jews wear the Jew badge was rigorously enforced, although some exceptions were made by noble decree, usually for court Jews or physicians and sometimes for their families. In rare cases, the badge laws were abolished for an entire community; for example, in 1541 Charles V annulled them in the county of Öttingen. Generally, though, badge laws remained in effect until the Emperor Joseph II abolished them in 1781.

The most common form for the Jew badge was a yellow ring two to three inches in diameter worn on the left breast of the outer garment. Some illustrations show a ring that looks like it might have been a brass hoop, perhaps pinned onto the garment, but the instructions that have survived for making the badge describe a yellow cloth ring that was to be sewn on.

By the late seventeenth century, when ruffed collars were in vogue, a yellow collar, or a collar with a yellow edge, became a common form for the badge, but the legal requirement of a yellow ring remained in force to the end of the century in much of the Holy Roman Empire. In many cases, women wore the same badge, but Jewish women's headdresses were also distinctive and served the same purpose in many communities.

During prayer, all Jewish men have traditionally covered their heads with a hat, although this is generally agreed to be a matter of tradition and not law. In the Sephardic community, some Jews only wore hats during prayer, but the Ashkenazic tradition was to wear head coverings at all times. By the seventeenth century, as several portraits by Rembrandt make clear, many of the Sephardic Jews of Amsterdam were wearing an essentially modern yarmulke at all times, and wearing it under other, more fashionable hats when out in public. There is no reason to believe that the Ashkenazic tradition was any different, as this certainly conforms to the practices of Eastern European Jews into the twentieth century.

During the middle ages, Ashkenazic Jews developed the custom of wearing peaked felt hats that came to be known as "Jews' hats." For two centuries prior to 1425, German Jews were required to wear such hats, and they remained in occasional use even after the enactment of the badge laws. There is no evidence, however, that these hats were worn in the seventeenth century, and one apparent reason for the introduction of the Jew badge was the decline in popularity of the distinctive Jew's hat.

Broadly speaking, Jewish law forbids shaving, although the use of scissors to cut the hair very closely is permitted. More detailed analysis of Jewish law shows that shaving of parts of the head and face are permitted, but not the sideburns, chin or upper lip. Generally, prior to modern times, few Jews would have shaved except secret Jews, who would have followed the shaving customs of their Christian neighbors. In the Ashkenazic world of the seventeenth century, many men would have trimmed their facial hair closely with scissors, while others, particularly rabbis, would grow full beards. The tradition of growing long*peyos* —sidelocks—as a sign of piety was distinctly Ashkenazic, with medieval origins.

Sidelocks could be pushed behind the ear or allowed to hang free. Documentation of the age of these traditions is found in illuminated manuscripts.

The modesty code of Jewish law has generally been interpreted as requiring Jewish women to cover their arms and legs, and also requiring that married women cover their hair. This was not materially different from the conventions of the Christian world of the seventeenth century, but it is noteworthy that Jewish women of seventeenth-century Germany frequently wore a headdress that took a two-horned or two-paddled form, possibly supported by a pair of combs set into a single bun at the rear, or possibly covering a "double bun" hairdo similar to that worn by Princess Leia of*Star Wars* fame. The veil worn over the buns and hair combs was frequently marked by two blue stripes, and the badge laws of some regions recognized such a veil as a variant Jew badge.

Remember that the folk costumes of European women frequently involved elaborate headdresses that clearly identified their regional or ethnic origins; the distinctive Jewish women's headdress fit into this more general pattern. In sixteenth-century Italy, Jewish women began to wear wigs as head coverings, but this fashion spread slowly, and it was only centuries later that most Ashkenazic women began to wear wigs in order to technically cover their hair while following bareheaded fashions of the era.

Finally, note that the modesty code of Jewish law was generally interpreted as forbidding men and women from touching in public. As an example, for a Jewish man to shake hands with a Jewish woman would have been considered quite improper in the seventeenth century. To use modern terminology, initiating such contact would have been seen as sexual harassment. There was also a tradition that a Jewish man should not give something directly into the hands of a Jewish woman other than his wife; instead, men would set things down where the woman could pick it up. This tradition avoided the risk of touching and it avoided coming close to the marriage ritual, since one way to create a legally binding marriage involved the groom giving an item of even nominal value into the bride's hand. Similarly, for a man and a woman other than his wife to enter a room and close the door behind them could create the impression of sexual impropriety, so this too was prohibited.

Jewish Travel

Jewish law forbids work and travel on*Shabbos,* the Sabbath or Saturday;*Yom Kippur* , the Day of Atonement; the two-day holy days of*Rosh Hashanah,* the New Year,*Shavuos,* Pentecost; and the first and last two days of each of the eight-day festivals of*Succos* and*Pesach,* Passover). The dates of the festivals are fixed in the Jewish lunar calendar, and*Shabbos* and all of the festivals run from sunset the night before to nightfall of the final day. Authors interested in writing historical fiction that involves Jewish characters should use a perpetual calendar to locate the dates of the festivals for the year in question. The resources section at the end of this essay lists several good perpetual calendars available on the Web.

The travel restrictions for the Sabbath allow walking 2000*amos* (cubits) beyond the border of the city walls, and they forbid carrying anything, even something as small as a housekey, outside the border of the *eruv* or walled Jewish district. Many modern commentators arbitrarily define 2000*amos* as one kilometer, although 3000 feet would be more accurate. The restrictions on travel and carrying during the festivals are only slightly less restrictive.

The complexities of the general requirements for observing the spring festival of*Pesach* are such that Jews of the seventeenth century would not begin a long trip until*Pesach* was over. Where Easter falls after*Pesach* , it would generally not be safe to begin the trip until after Easter, as a matter of self-protection. Long trips during the winter would be unlikely because of the weather and lack of

all-weather roads, but if a Jew set out on such a trip, he would generally attempt to return home at least a week before*Pesach* in order to have the time to prepare for the festival.

Similar constraints surround the fall holiday season, which for Jews, runs from*Rosh Hashana* through the Days of Awe to the fast day of*Yom Kippur* and then through the festival of*Succos* , which ends with *Simchas Torah* . Jews on a long trip would generally plan to reach their destination before*Rosh Hashana* , and they would rarely start a major trip until after*Simchas Torah* . Long distance travel after these fall holidays would be rare because of the weather.

As a result, except in the case where war or expulsion forced Jews onto the road involuntarily, the Jewish travel season would have been from the end of*Pesach* or Easter, whichever came later, until*Rosh Hashana* .

In general, long-distance travelers would hope to reach the safety of the Jewish quarter of a town by Friday of each week, and they would almost certainly avoid travel on Sunday because of the threat of persecution. The gates of many Jewish quarters were locked on Sundays. Thus, a typical traveler would have five days per week available for travel, and there are typically 109 days available for travel between *Pesach* and*Rosh Hashana* . Because*Shavuos* fell in midweek in 1632, long-distance travelers might well elect not to travel that week, and many travelers would not travel during the fast day of*Tisha Bav* in August, because travel on an empty stomach is uncomfortable.

Thus, a typical Jewish merchant would plan on about a hundred days of travel per summer. If we assume that this is done on foot with a loaded pack at about fifteen miles a day, this gives the traveler a range of fifteen hundred miles per year. As the crow flies, it is about five hundred miles from Frankfurt to Lodz, Poland, but it is dangerous to measure distances that way. On foot along the roads of the seventeenth century, the path could easily have been twice this long. A round trip to Lodz would thus be unlikely in a year, but a one-way trip could easily be planned. Any traveler planning such a trip would be well advised to leave soon after*Pesach* in order to allow for difficulties along the way, but such a traveler would not worry overly about the loss of a week here or there along the road. A well-to-do traveler on horseback or traveling by carriage could easily double this travel radius, planning on a visit to Poland and return in one summer with time to spare.

The biggest special financial difficulty faced by Jewish travelers was paying the Jew taxes required for entry or temporary residence in various communities along the way. This tax varied; sometimes Jews entering a city paid the same head tax as livestock. Foreign Jews in the county of Öttingen were required to pay an eighteen kreuzen daily poll tax set in 1623. The annual rate was eight thalers in eighteenth-century Berlin, seven gulden in late seventeenth-century Oldersum. In addition to their use as a source of revenue, Jews taxes were used to prevent entry of Jewish refugees into a community and to discourage them from staying if they were passing through, although there were occasions when these taxes were waived on humanitarian grounds.

Jobs in the Jewish community

Whatever the source of income for the Jewish community as a whole, the internal economy of the community generally created a number of jobs. There were teachers, or*malmud* s, in the*cheder* —elementary school, and rabbis for the*yeshivah* —secondary school or seminary. Only the more important communities had*yeshivos* . In general, all Jewish communities dating back to Roman times had an established system of public education. The obligation to provide for schooling is placed squarely on the community in the Talmud, and there is ample evidence of public funding for schools in both the

Ashkenazic and Sephardic worlds.

It is worth noting here that the Talmud, which is written in Aramaic, was the central subject of study in the*yeshivah* , so any*yeshivah* graduate was literate in both Hebrew and Aramaic. In general,*yeshivah* graduates are entitled to be addressed as rabbi, although not all of them are entitled to sit as judges on a rabbinical court. Not all*yeshivos* were organized formally, and some rabbis of the seventeenth century took on individual students for private study leading to ordination.

Because of the need for kosher meat, any Jewish community, even a small one, would have someone who was trained as a*shochet* , a specialist in kosher slaughter and butchering; the Yiddish word*shechter* , from the same Hebrew root, is also used, and it eventually became a family name. The training required for a*shochet* centered around study of the laws of kosher slaughter in the*yeshivah* , but of course, it also included practical training in the care and use of the specialized tools of kosher slaughter, how to properly salt the blood out of the meat, and other aspects of the butcher's art. The most notable tool of the*shochet* is the knife used for slaughtering cattle; this has a 2-foot square-ended razor-edged blade that must be perfectly sharp and free of defects before each use.

The laws of*kashrus* generally place no restrictions on whole fruits and vegetables, but there are very strong prohibitions about drinking wine (or other grape products) that have been made with the intent that it be used by idolaters. This prohibition dates back to the times of the cult of Bacchus, but the use of wine as a Christian sacrament guaranteed the extension of this prohibition to the present day. Because of this, Jews generally have used kosher wines, that is, wines made by Jews. Kosher wine could be made by the individual homeowner, starting with whole grapes or raisins. However, there were many kosher winemakers in Europe; the great Torah commentator Rashi supported himself as a winemaker, and the better kosher wines were shipped over fairly long distances.

The laws of*kashrus* also forbid the eating of bread baked by a non-Jew, and they forbid cooking over a fire lit by a non-Jew. The concern about bread is that the bread may have been baked using lard or non-kosher tallow and that the oven itself may have been non-kosher because of contamination with food residues from non-kosher cooking. While anyone can bake bread at home, home ovens were still uncommon in the seventeenth century, so most communities relied on Jewish bakers or communal ovens. It was not uncommon for the communal ovens to be part of the synagogue complex.

The torah scroll required for a public worship service and the smaller scrolls enclosed in*mezuzot* and *tefillin* , to be discussed in a moment, were all required to be handwritten on parchment prepared from the skin of a kosher animal, usually calfskin velum. Every Jewish community of any significant size would have a*sofer* , a scribe trained in the copying of these texts. The*sofer* was generally a*yeshivah* graduate, and his practical training included the making of pens, ink, parchment and hide glue, as well as the copying of texts. With the advent of printing, it is highly likely that the first typesetters and proofreaders involved with Hebrew printing were*soferim* . A Jewish marriage contract, a*ketubah* , generally required the services of a*sofer* , as did divorce papers.

Every Jew is commanded "to write these words on the doorposts of your house" (Deuteronomy 11:21), and this commandment has been taken almost literally since biblical times by affixing a small handwritten parchment scroll containing Deuteronomy 6:4-9 and 11:13-21 to the doorpost of the entrance to a Jewish house. The case containing this scroll is called a*mezuzah* , and the most visible sign that a house is occupied by Jews is generally the presence of a*mezuzah* on the doorpost. On passing through a door marked by a*mezuzah* , essentially all seventeenth-century Jews would give it a symbolic kiss, touching it with their fingers and kissing their fingertips.

As mentioned previously, all Jewish men would wear some form of*talus* , or prayer shawl during daily

morning prayers. In addition, essentially all adult Jewish men of the seventeenth century would wear *tefillin* on weekdays but not on*Shabbos* or the festivals. Some writers prefer to translate the word*tefillin* as*phylacteries* ; the latter is technically an English word, but it is so rare that there is no good reason to prefer it to the Hebrew.

Tefillinare cubical leather cases containing small parchment scrolls with the texts of Exodus 13:1-10, 11-16, Deuteronomy 6:4-9, and 11:13-21, in fulfillment of the commandment to "Bind them as a sign on your hand and let them serve as a frontlet between your eyes." The*tefillin* worn on the forehead is held on by a leather strap with a complex quatrefoil knot at the back, while the*tefillin* worn on the upper arm is held in place by a long leather strap that is wound around the arm, hand and fingers in a complex way.

The Synagogue and Jewish Community

By the middle ages, all Jewish communities in Europe had fairly well-defined communal structures. Communities were generally led by an elected council, and the head of this council, the*Parnas* , could properly be called the president of the community. Under Jewish law, the community was responsible for providing schools, a synagogue, a cemetery, a burial society, a bath house or*mikvah* , and financial support for widows and orphans. Ovens were also frequently constructed by the community since it was difficult for individual families to afford the large brick ovens of the pre-modern era. The community had the legal mandate under Jewish law to tax its members to support these institutions. These obligations were reinforced by the Christian authorities, who frequently demanded that the Jewish community administer the Jew taxes and provide for the Jewish poor so that they would never burden Christian charities.

As a result of all of this, synagogue buildings frequently served many purposes beyond worship. They provided classroom and meeting space, and they frequently incorporated community facilities such as a *mikvah* or bath house and ovens. Backing the oven up against the wall of the*mikvah* was a good idea in areas where the winters were cold! Some*mikvos* even appear to have had Roman style hypocaust heating systems. Given that the Jewish community in the Rhineland dates back to Roman times, this should not be surprising, but of course, each time a community was expelled or slaughtered, such complexities tended to be simplified or lost.

Because ten adult men (age 13 or older) were required for a full religious service, the presence of a synagogue in a town generally implied the presence of around ten families. Similarly, two synagogues implied the presence of around twenty, although unless there was an ideological or liturgical dispute, it would usually take a much larger population before a second synagogue was founded. The Christian authorities generally regulated the foundation of synagogues, but where there was no legally constituted synagogue, congregations frequently met in private homes.

The sanctuary of the synagogue or*schul* would always contain an ark, or cabinet along the eastern wall to hold the Torah scrolls. The ark would have both a cloth curtain and a wooden door, so you must open both to expose the Torah. When these are open, tradition demanded that the congregation stand as they would in the presence of royalty because the Torah is the word of God. It takes a Torah scroll to hold a full service, but a synagogue would hope to own at least two because many services had readings from different parts of the Torah that would require long pauses to wind and rewind the scroll if there was only one. The larger wealthier synagogues of the seventeenth century usually had many Torah scrolls.

The Torah scroll was handwritten on parchment, and it was wound around two posts, called the*eitz chiam* or trees of life. No other Jewish scroll was ever wound on two posts. The complete Torah scroll

was big, with pages about two feet tall sewn side by side, with text written in columns about eighteen inches tall by six inches wide. Posts and all, a Torah scroll weighs ten to fifteen pounds, depending on how thin the parchment was scraped. Lighter scrolls on thin parchment with smaller lettering would cost more than big scrolls on thick parchment with big lettering. When stored in the Ark, Torah scrolls are always stored vertically, resting on their*eitz chiam* and leaning back against the back of the ark.

Torah scrolls were dressed differently in the Sephardic and Ashkenazic world, but the Amsterdam Sephardic world followed Ashkenazic customs. Sephardic scrolls were typically permanently bound into a wooden clamshell case with a silver cover. These cases are cylindrical, and when opened, they expose just enough of the scroll to be read. Ashkenazic scrolls were dressed in a cloth cover, typically the most expensive cloth available, with lots of fine embroidery, and then armed with a breastplate and crown. The crown, if there is just one, would look like what you expect a king to wear. If there were two, they would be called*rimonim* , and would be tall and narrow, sometimes resembling gothic spires, with one set over each of the*eitz chiam.* The armament for a Torah scroll would typically weigh several pounds, and it would be made of silver as befits royalty. The fact that the Frankfurt Jewish community had to sell its synagogue silver in the winter of 1631-32 is evidence of how desperate that community was, since this is close to the last thing a community would sell off in hard times.

Synagogues of the seventeenth century were generally built in the round, with a central reading table large enough to unroll the Torah scroll for reading and still have space for several open books on each side. This was necessary because, during the Torah reading, the reading table needed to accommodate not only the reader and the person called up for the honor of saying the blessing over the reading, but also two checkers who follow along in their printed copy of the text and correct the reader when he makes mistakes. The reading table sits on a raised platform in the center of the room, called the*bimah* , and it faces the ark. In the seventeenth century, it was very rare to put the*bimah* anywhere but the center of the room.

During the Torah reading, everyone would typically sit facing the*Bimah* , and many would follow along with the reading if they had a copy of the*Chumash* , the printed text of the Torah. Except during a few special prayers, notably the standing prayer or*Amidah* , it was not unusual to find quiet conversations while the service was in progress. During the*Amidah* , everyone was expected to stand and face east.

With extremely rare exceptions, women and men never prayed together in the seventeenth century. The Talmud states that the voice of a woman is indecent, and where some interpreters held that this applied broadly, it was generally agreed that this applied in the context of prayer. A notable exception to this rule is that after successfully giving birth, a woman was required to stand before the congregation to say a thanksgiving blessing. What would become a standard synagogue layout, with women's galleries above the main level, was developed in Amsterdam around 1639. Prior to this, for many centuries, many synagogues had included a women's gallery off to the side or in back. The minimum separation between the women's gallery and the main sanctuary was a railing, but many synagogues had lattices. Technically, women had no obligation to pray in the synagogue, but there is ample evidence that many did.

Jewish Religious Practice

In general, observant Jews would pray three times a day; in Jewish communities of the seventeenth century, one of the jobs of the synagogue*shamus* (sometimes translated as*sexton* or*beadle*) was to bang on shutters in the morning in order to rouse his congregation for morning prayers. The longest prayer of the day was the morning prayer, which was traditionally said before breakfast and could take an hour. There were traditional short forms of this prayer that could be said if work was pressing, and in

a real pinch, it could be reduced to just the*Shema,* "Hear, O Israel, the Lord our God, the Lord is One" (Deuteronomy 6:4). There was a strong emphasis on saying the morning prayers with the congregation if at all possible. The*Shema* was also said in the evening, and traditionally, Jews hoped that the*Shema* would be on their lips as their last breath.

The afternoon prayer had to be said before sunset, and the evening prayer had to be said after sunset. When these were said communally, particularly in the winter, they were frequently said in quick sequence, one after the other at sunset.

A central element of all three daily prayers was the*Amidah* or standing prayer, a sequence of*bruchas* or blessings said while standing. In the morning and afternoon prayers, the tradition for communal worship was to recite the*Amidah* privately, silently, in a whisper or in a quiet voice, and then have the*chazzan,* the cantor, chant it aloud when everyone had finished their private recitation. As a general rule, when a Jew heard someone say a blessing, he was required to respond Amen, or*Omain* , as an Ashkenazi Jew would likely have pronounced it. It follows that the congregation would respond with an Amen after each of the blessings in the*Amidah* . The evening*Amidah* was said privately, without a cantoral repetition. During the*Amidah* in particular, but while standing at prayer in general, Jews traditionally sway back and forth. This practice is ancient and well documented in medieval sources.

All services contained psalms. One psalm in particular is said as part of every service,*Ashrei* , which is Psalm 145 expanded with a few borrowed verses of other psalms. The preliminary segment of the morning service included a block of psalms ending with Psalm 150 before the introduction to the*Borochu* , the call to worship.

After each section of each service, some version of the*Kaddish* would be said. This prayer is in Aramaic, not Hebrew, and there is the short or half*Kaddish* , the long*Kaddish* , and the mourner's *Kaddish.* The Sephardic community has a slightly different version of the long*Kaddish* than the Ashkenazic, and some Jews speculate that the Lord's Prayer of the Christian world began as yet another version of the*Kaddish* . The mourner's*Kaddish* , it should be noted, is said by those who have lost a spouse, parent, child or teacher in the past year, or on the*yartzeit* (anniversary) of the death. All other *Kaddish* es would be said by the*Chazzan* . Different communities had their own traditons about standing or sitting, but in general, in the seventeenth centuries, most communities would stand during the*Kaddishes* .

Every Jew had the legal right to stop the service in the synagogue immediately before the Torah reading in order to present a grievance and demand justice. While this right was never widely exercised, it provided an important check against injustices being perpetrated by the community leadership.

Readings from the Torah Scroll would be included in the morning and afternoon services on*Shabbos* , the Sabbath or Saturday, as well as on Mondays and Thursdays, but only when a*minyan* of ten men is present. The readings are traditionally chanted to a rather complex trope, so the practice has long been to have a expert in Torah trope do the readings. Because the Torah scroll contains no vowels, it is also traditional to have two others at the*bimah* (lectern) to check the reading and offer corrections to any error. During the reading, members of the congregation are called up to the Torah, nominally to read their portion, but in fact, merely to say the blessings before and after their portion while the reader does the actual work. The*Shabbos* morning reading is the longest, broken into eight sections, while the other readings are shorter, with only three. After the*Shabbos* morning Torah reading, the final person called up reads the*Haftorah* , a selection from the prophets selected to complement the Torah reading. By the seventeenth century, the*Haftorah* readings and the text used by the checkers would both come from printed copies of the*Chumash* , not from scrolls.

As a rule, was is not possible to conduct a full worship service without a*minyan* , a quorum of ten men over age 13. If a minyan was not present, the*Chazzan* could not repeat the*Amidah* , the*Kaddishes* could not be said, and the*Torah* and*Haftorah* could not be chanted. These parts of the service were simply omitted, both in the synagogue, if less than ten were present, and in private prayer. If ten men were present, whether or not they were in a synagogue, these parts of the service would become obligatory, although if there was no Torah scroll available, obviously it could not be read.

A rabbi was not required for the conduct of any Jewish worship service. Any knowledgeable Jew could lead services. Of course, as the most knowledgeable member of the community, the rabbi was likely to be called on to lead services. Synagogue services in the seventeenth century rarely contained anything resembling a sermon. In general, public preaching was dangerous because an attempt to explain the Torah in a context where a Christian might be listening could contradict some biblical interpretation of the Church, bringing down the wrath of the Christian authorities on the Jews.

Whether in public or private, the worship service was supposed to be read and not recited from memory. Every observant Jew hoped to own a copy of the*Siddur* , or prayerbook, along with a *Chumash* , an annotated copy of the Torah. Typically, many students would complete their own handwritten copy of the*Siddur* as part of their schoolwork in premodern times, but by the seventeenth century, printed prayerbooks were common. The standard printed form of the*Chumash* in the seventeenth century included Rashi's commentary along with the Aramaic translation of Onkelos; some editions of the*Chumash* and*Siddur* were available that offered Judische Deutsch translations as well.

After the*Shabbos* evening service Friday night, the men would go home to their families for dinner. The women of the household were responsible for having the table ready, with specially baked bread, known as*challah* , and wine and candles. All cooking was required to be completed and the candles lit about half an hour before sundown, although food could remain in a warm oven or over a banked fire for as long as needed.

Both the*Shabbos* evening and morning services would end with making*kiddush* , that is, the*chazzan* or some member of the congregation would say*bruchas* over wine and then over the bread. These were said for the benefit of travelers who might be staying and eating in the synagogue, which sometimes served as a community guesthouse. Outsiders may think these*bruchas* are blessing the wine and bread, but they do not bless the food, they give thanks for it. In some cases,*kiddush* was expanded into a full meal in the synagogue.

The home was also an important center of Jewish worship. Before eating a meal, it was traditional to say a very brief*brucha* for the food being eaten. On*Shabbat* ,*kiddush* was said, even if the men had already said it in the synagogue. The*birkas* or grace after meals is much longer and in the Ashkenazic world; it was generally read from a*bentscher* , a small book of prayers for the table, and chanted to a rollicking melody that invites a family sing-along.

In general, the Ashkenazic community had the most developed musical system, while the Ashkenazic stereotype of the Sephardic community was that their melodies for prayer and Torah trope were loud and toneless. Like other stereotypes, this is not entirely fair, but the greatest Sephardic melodies are reserved for hymns and nonliturgical music. Where the Ashkenazic worship service centered on the solo performance of the cantor, with congregational responses, the Sephardic service was more likely to include congregational singing. Some tunes span the Sephardic-Ashkenazic gap and probably date back to the Roman era and possibly before that; these include some of the melodies for the*Kaddish* and the Song of the Sea (Exodus 15:1-21), as well as the basic melodic framework of the Torah trope.

Kaballah

The greatest controversies sweeping through the Jewish world of 1632 centered on the*Kaballah* . The term "Kaballah" refers to the received mystical tradition that kabalists insist can be traced back to Moses. Skeptics trace large elements of this tradition to Moses de Leon who lived and wrote in thirteenth-century Spain. Whether Moses de Leon was inventing, creating a new synthesis or transmitting received wisdom, his book, the*Zohar* , played a central role in the development of Kaballah.

Traditional Judaism imposes strict limits on who may delve into the esoteric world of mysticism. A man was not to study mysticism or metaphysics until he reached age forty, until he was married, and until he had mastered Talmud. In addition, these subjects were never to be studied alone, but were to be studied under the direction of a wise teacher. These restrictions are found in the Talmud.

Rabbi Isaac ben Shlomo Luria Ashkenazi, the son of German Jews living in Jerusalem, changed much of this in the mid sixteenth century. In his early twenties, he studied the Zohar on his own while living in Egypt. While there, he had visions of meetings with the prophet Elijah. These meetings led him to move to Safed, in the Galilee, where he joined the community of Sephardic kabalists there.

Luria became a leader of this community and was hailed as the*Ari* or the Lion. The Lurianic Kaballah he taught spread like wildfire after his death in 1570 and its publication by Luria's student Chiam Vital. In short, the Lurianic Kaballah teaches an expanded version of the creation story, it gives reasons for prayer and piety, and it teaches that the coming of the Messiah is imminent.

Under Luria, the kabalists of Safed created new liturgy, weaving kabalistic elements into the service, notably the*Kabalat Shabbat* element of the Friday evening service, which receives the Sabbath with psalms and the beautiful hymn*Lecha Dodi* that uses imagery from the Song of Songs, likening the arrival of the Sabbath to the arrival of a bride at the wedding.

The kabalistic creation story begins before creation, when God was initially all that there was, indivisible, unchanging and free of all properties. Neither space nor time existed in this state, known as the*Ayn Sof* , meaning without end. In order to allow creation, God underwent a process of withdrawal, creating the void in which creation could occur, walled off from the divine light so that we in the created universe can have free will.

Kabalists hold that the*sephiros* were created to channel or contain the divine energy. The Zohar identified ten*sephiros* , and kabalistic imagery frequently arranges these into a pattern as the tree of life. The word*sephiros* , pronounced*sephirot* in Sephardic, has been translated as*numbers* , from Hebrew, or explained as a borrowing from the Greek for*spheres* .

The kabalistic creation story continues that the*sephiros* were smashed during God's first attempt at creation, scattering divine sparks or shards throughout the universe. The creation story in the book of Genesis must therefore describe God's second attempt. The kabalists go on to explain that the reason God created humanity was to create agents to aid in the repair of a fallen world, bringing about the original intent of creation by finding and liberating the divine sparks. We do this by performing the*mitzvot* or obeying God's commandments.

Kabalistic mysticism frequently focused on contemplation of the*Ayn Sof* , but unlike many streams of mystical thought, the emphasis was on action in this world, reaching up to bring the divine down instead of seeking to escape this world into the divine. Kabalists taught that, when a person perfors a*mitzvah* , a divine spark is released, and that the release is more effective if the person performs that*mitzvah*

knowingly and in the right state of mind.

From this teaching, kabalists concluded that we personally can play a role in bringing the Messiah, redeeming the world and bringing about the final judgement. This new teaching found fertile soil in the world of European Judaism in the early seventeenth century. It is reasonable to describe the spread of Kaballah as a wave of pietist religious revival through a people who felt helpless in the face of an obviously broken world. By midcentury, kabalistic thought had become normative throughout the european Jewish world.

Resistance to the acceptance of the Lurianic Kaballah was based on some fairly obvious grounds. Opponents held that kabalists were violating Talmudic restrictions on the study of the esoteric and that kabalists were telling a creation story that could not be found in Torah or Talmud. Perhaps the most important objection, though, is that the mystical explanation of the reason for performing the*mitzvos* was wrong on at least three counts.

The first problem opponents would raise is that Judaism had long held that one should perform God's commandments for their own sake, not in order to influence God. Second, the idea that one could force God's hand by sufficient piety struck some as sacreligious. Finally, the idea that human piety could force the coming of the Messiah has a dark side, allowing believers to hold the community responsible if the Messiah does not come. Indeed, this led some kabalists, when they became community leaders, to take an extremely rigid attitude toward any lapses in personal piety within their communities.

Opponents would say that the downside of the Lurianic Kaballah was realized when Rabbi Nathan of Gaza proclaimed Shabbatai Zvi of Smyrna to be the Messiah, the fulfillment of the Messianic hopes of the kabalists. This story spread through Europe starting in 1665, and many communities were deeply divided between believers in Shabbati and scoffers. When Shabati Zvi confronted the Sultan and was forced to convert to Islam, the news embarrassed huge numbers of Jews throughout Europe and shattered the faith of many.

The Sephardic World

Sephardic Jews originally come from*Sepharad* , the Jewish name for Spain, or*Al-Andalus* , as it was known to Muslims of the time. During the four centuries before the Christian*Reconquista* , this community flourished as the intellectual center of the Jewish world, producing great poets such as Solomon Ibn Gabriol; renaissance men such as Judah Halevi, known both for his poetry and his theology, and Abraham ibn Ezra, physician, theologian and astronomer; Rambam—Maimonides—known for his philosophical and medical works as well as his theology; Ramban, also known as Nachmanides, renowned both as a physician and theologian; and Isaac Abravanel, who was court Jew to Alfonso V of Portugal and to Ferdinand and Isabella of Aragaon and Castile, as well as a theologian of note.

Prior the expulsion of 1492, Jewish life in Spain and Portugal varied from idyllic to terrible, with enough of the former to keep alive the dream of coexistence, but enough of the latter to keep this dream in doubt.

The Almohad, or Berber, dynasty of the twelfth century forced many Jews and Christians to chose between flight, conversion to Islam or death; at around the same time in Christian Spain, Jews were forbidden to hold public office, and royal debts to Jews were cancelled. Christians instigated pogroms in 1391 that led to widespread forced conversions and massacres of Jews throughout Christian Spain. The Spanish inquisition, begun in 1478, began to systematically hunt down*Marannos,* or secret Jews, who

had publicly converted to Christianity to avoid persecution, and in 1492, Ferdinand and Isabella signed their order of expulsion.

After their expulsion from Spain, huge numbers of Jews fled to Portugal, where their refuge lasted just long enough to separate them from what money they had managed to bring out of Spain. Written accounts by refugees in this period suggest that the death rate among refugees was extremely high, with shiploads of Jews turned away from port after port as they sought food and shelter.

Large refugee communities made it to the Ottoman empire, settling from Ottoman Palestine to the Balkans. Salonika became the new commercial center of Jewish life, and*Tzefat* (Safed) in the Galilee became a new spiritual center. Sephardic refugees also came to dominate many of the old Jewish communities of northern Africa, notably those of Morocco and Algeria.

Converserosor*Marannos* were followed by the inquisition wherever they went within the Catholic world. Whatever degree of personal piety they preserved, they were forced to behave in public as more Christian than the Christians. Only in Protestant or Islamic lands could*Converseros* "come out" as Jews.

With the Protestant Reformation and the Dutch rebellion,*Marannos* from Portugal found refuge in Amsterdam starting in 1593. It was a very rocky start; the first Jewish settlers were captured by English pirates before they finally made it to their destination. The first communal worship service in Amsterdam was held in 1595 at the home of the Moroccan ambassador, Don Samuel Palache. In the years that followed, a small Ashkenazic community also settled in Amsterdam, but these communities had little to do with each other.

The*Beit Yaakov* (house of Jacob) synagogue was founded in 1596 in rented space, and in 1608, a second synagogue was founded,*Nevi Shalom* (prophet of peace). The latter was not a peaceful synagogue; it was torn by internal dissent under Rabbi Isaac Uzziel of Fez; in 1622, Uzziel's student, Menasseh ben Israel succeeded him. The controversy under Rabbi Uzziel led to the founding of the*Beit Yisrael* (House of Israel) synagogue in 1618 by Abraham Farrar, a man known as a freethinker.*Beit Yisrael* was headed by another student of Isaac Uzziel, Rabbi Isaac Aboab de Fonseca from about 1626 to 1638. Rabbi Uzziel and his students were all kabalists.

Jewish worship in Amsterdam was not formally legalized until 1615, when laws were passed allowing Jewish worship and forbidding Jews to speak publicly or publish anything against the Christian religion or to intermarry with Christians. From 1615 to 1638, the Jews of Amsterdam were governed by a community council that included representatives of all three synagogues. The three congregations merged in 1638, with the*Beit Yisrael* building converted to a school while*Nevi Shalom* , with city approval, became the Sephardic synagogue.

Menasseh ben Israel printed the first Hebrew book in Amsterdam in 1627, and the Amsterdam printers set new standards for the quality of their Hebrew typography, eclipsing the printers of Venice, who had set the standard up to this time.

In the 1580's, Sephardic Jews began to settle in Hamburg, where they were welcome and treated as if they were Christians. Among them were a spice merchant, a trader with Brazil and a sugar importer. In 1603, the community was first recognized as Jewish, with an immediate demand for their expulsion. This demand was repeated by the clergy in the following decades. By 1612, the community had grown to 125, and the Senate of Hamburg issued a residence permit good for a period of five years for a cost of 1000 Marks, simultaneously forbidding the practice of Judaism. The fee was converted to an annual tax, and restrictions against the practice of Judaism began to lift gradually. In 1611, the Jewish community was allowed to appoint a rabbi; in 1623, kosher slaughter was permitted, and in 1628, they were granted

a prayer hall. Jews were not permitted to live in the inner city, but were allowed to live freely in the developed area outside that. There were only a few Ashkenazi Jews, with that community growing to fifteen families between 1600 and 1649 when the Ashkenazi Jews were expelled. This is one of the rare cases where the Christian government authorities made distinctions between the Sephardic and Ashkenazic communities.

The Ashkenazic World

Ashkenazic Jews come from*Ashkenaz* , the Jewish name for the Rhineland. Jewish settlement of Ashkenaz dates back to the late Roman era, but we know that there was a major influx from northern Italy between the eighth and the twelfth centuries. By the time of the Crusades, the Ashkenazic community was vibrant, spreading from Paris to Prague.

The Crusades were the first of a series of great disasters to befall this community, killing a sizable fraction of the entire Ashkenazic community. The seventeenth century was an equally severe disaster, and between the Crusades and the seventeenth century, stories of massacre and expulsion were an everpresent element of Ashkenazic life. Most towns in Ashkenaz appear to have suffered a major massacre or expulsion about once per century. The Rindfleisch massacres of 1298 swept a large part of the Rhineland, as did the persecutions of the fourteenth century surrounding the Black Death. The Protestant Reformation brought yet another wave of expulsions from newly Protestant cities in the sixteenth century.

The Ashkenazic community of the seventeenth century was well connected to the larger Jewish world. For example, the false messiah David Reuveni from Yemin and his disciple Solomon Molcho from Portugal came to Regensburg to see Emperor Charles V, and emissaries of the Sephardic community of Safed, in the Galilee, came to many Ashkenazic communities to spread the teachings of the Kaballah. Jewish merchants frequently crossed the Alps from Italy, and there were also open commercial routes between Salonika in the Ottoman empire and Prague to the north. There is ample evidence of rabbis trained in Poland serving French or German communities as well as the reverse. Not too many years after the Thirty Years' war, news of the false messiah Shabatai Zvi swept north from the Ottoman world to attract attention throughout the Ashkenazic world.

Ashkenazic Communities of the Seventeenth Century

In response to persecution over past centuries, many Jews had already fled east into Poland, and by the last quarter of the sixteenth century, a unique new living arrangement had emerged there. The Polish government granted a degree of autonomous self-government to the Jews that they had not seen since the Romans destroyed Jerusalem. The "Council of Four Lands," as it was called, met at Lubin between Purim and Passover in the spring, and in Yaroslav during the month of Av or Elul, and was composed of representatives of each Jewish community in Poland, Lithuania, Podolia (Polish Russia), Volhynia and Galicia. Polish documents refer to this as the*Congressus Judaicus* or*Seim* (Diet) of the Jews. The governing structure included a supreme rabbinical court, with jurisdiction over all civil cases between Jews, as well as the congress, which had control over taxation within the Jewish community and budgetary responsibility for supporting schools and other community institutions.

With each new hardship for the Jews of the various German states, new waves of Jews moved east, but the Ashkenazic heartland was still fairly populous until the Thirty Years' War. Outside of the heartland,

there were healthy Ashkenazic communities in France, Austria and Hungary, and the Alsatian community spread south into northern Switzerland. The following brief descriptions focus on the Jewish communities within a few weeks travel from the Thueringerwald:

The Ashkenazic Heartland

Worms had a Jewish community before the year 1000, and suffered the usual massacres and expulsions, with the most recent expulsion in 1615. By imperial order, Jews were readmitted to Worms in late January 1616. The winters of 1632 and 1635 brought "pestilence," probably plague, and the taxes imposed on the community drove it into extreme poverty. Many Jews were imprisoned for nonpayment of taxes until an imperial order in 1636 cancelled the taxes and ordered their release.

Mainz or Mayence had a Jewish community in the early tenth century, but the usual expulsions and massacres ended with the massacre of 1349. A new Jewish community was not started there until 1583. This community grew by the addition of refugees from Frankfurt-am-Main in 1614 and from Worms after the expulsion there in 1620. In November 1620, Pappenheim stormed Mainz and gave no quarter to its residents, but the Jewish community continued, and in 1630, a rabbi was officially appointed.

Speyer had a walled Jewish quarter by the end of the eleventh century, but after the usual atrocities, there were fewer than ten Jewish families in Speyer during the early seventeenth century.

Metz had a Jewish community as far back as the first century, and this was one of the most secure Jewish communities in the region. By 1614, there were 500 Jews, and in 1624, 120 families and 600 individuals under the leadership of Rabbi Moses Cohen of Prague. At that time, the Jews had considerable freedom under letters patent granted by Henry IV in 1605, and Louis XIII enlarged these freedoms in 1632.

Ashkenazic Communities along the Main

Frankfurt am Main may have had a Jewish community in 1175, and after the usual ups and downs, this grew between 1543 and 1612 from 43 to 454 Jewish families. In August 1614, Fettmilch, the leader of the town's guilds, instigated riots that slaughtered a good fraction of the Jews of Frankfurt and led to the expulsion of the survivors. Fettmilch was tried, convicted and hanged for this crime, evidence of a sense of justice that was not typical of previous centuries. Although 1,380 Jews survived, it was not until 1616 that the community was allowed to reestablish itself under the protection of the emperor. In 1618, there were 370 families living in 195 houses, served by two synagogues, one built in 1462, one in 1603. Jews lived under the usual economic restrictions, and at times, the interest rate was reduced to a very modern sounding eight percent. The vastly overcrowded Jewish quarter was decimated by epidemics in the winter of 1632, when the entire town was impoverished by payments to Gustavus Adolphus. Rabbi Shabbethai Hurwitz was the elected chief rabbi and Rabbi Joseph Juspa Hahn was a rising star at the time. By 1694, Frankfurt had 109 Jewish money lenders, 106 dry-goods merchants, twenty-four spice merchants, nine retail beer and wine merchants, three innkeepers and two restaurants.

Hanau saw its first Jewish settlement in the thirteenth century, with the atrocities leading up to expulsion in 1592. Count Philipp Ludwig II reopened the town to Jews in 1603 and permitted the construction of a synagogue on the*Judengasse* . Initially, there were only ten families, but by 1707, the number had grown to 111, with a significant number being refugees from the Fettmilch riot in Frankfurt. A Christian printer in

Hanau, Hans Jacob Hene, produced about thirty Jewish works in Hebrew between 1610 and 1630; he must have cut his own type, because the letter*shin* in his typography was distinctive. He published a Jewish prayerbook in 1628, a number of works on theology and Jewish and popular works in Judische Deutsch. Among his typesetters, we know he employed the Günzburg family, and Mordecai ben Jacob of Prossnitz. Rabbi Menachem ben Elhanon was a noteworthy scholar in town, until his death in 1636; his school was the foundation of the yeshivah of Hanau.

Aschaffenburg, or Aschaff on some maps of the era, was home to a considerable Jewish community in the seventeenth century, but by the end of the century, only twenty members or twenty families remained. Rabbi Meïr Grotwohl is the only name I can find from the seventeenth century. In addition to the town Jews of Aschaffenburg, there were Shutzjuden in many of the surrounding towns.

Wertheim readmitted Jews in 1449, and they rebuilt their synagogue in the 1590's. In 1622, there were sixteen Jewish families.

Würzburg expelled its Jews in 1565. As was occasionally the case elsewhere, the community moved only a short distance, settling in Heidingsfeld, just across the river Main. Heidingsfeld's Jewish community had a charter dating back to 1498, which permitted seven families of*schutzjuden* to remain for a yearly payment of 120 florins. By the fifteenth century, the community had a rabbi, and with the expulsion of the Jews from Würzburg, it became the seat of the chief rabbi for the Würzburg region. Throughout the seventeenth century, the Jews of Heidingsfeld lived in a well-defined ghetto, probably limited to the land held by the seven charter families.

Schweinfurt closed all Jewish schools, and annulled all debts owed to Jews in 1544.

Bamberg had a Jewish community that was reestablished around 1500, although the threat of expulsion was constant during the sixteenth century. The community was devastated during the Thirty Years' War, but not destroyed; the community was wealthy enough, in 1683, to ransom itself in the face of a demand for expulsion. Their oldest surviving synagogue in the seventeenth century was a building dating back to before the expulsion of 1478, and starting in 1561, the community rented space in the rear of a building for another synagogue.

Nürnberg's Jews were expelled in 1499, and the evidence of Jewish settlement from then until 1824 consists largely of restrictive ordinances designed to suppress interaction with the Jews of Fürth and to prevent resettlement. From the mid 1500's to 1693, Jews were permitted to do business in public fairs outside the city but forbidden to enter the city.

Fürth, a suburb of Nürnberg, rose to importance when the Jews were expelled from the city. The Jews of Fürth at the end of the sixteenth century were privileged, living under the direct protection of the emperor, administered through the chief rabbi of the empire and subject to special taxes. The usual economic restrictions were applied, although Jews could buy and sell real estate and close contracts. By 1617, there were 1,500 Jews in Fürth, with a new synagogue built on land purchased from the cathedral provost of Bamberg. The synagogue was severely damaged by Mansfeld's troops in 1621, and Tilly used it as a prison. In 1634, the synagogue was used by the Croat cavalry as a stable. Trade between Christians and Jews was prohibited in 1623, and this prohibition was repeated in 1627, although by that time, trade was at a standstill because of the war. Fürth was home to a yeshivah, headed by Menachem Man Ashkenazi, who died in 1655.

Communities along the Frankische Saale

Hammelberg had a synagogue as far back as 1487; in the sixteenth century, a cemetery was purchased across the Frankische Saale, in the suburb of Pfaff, now the*stadteil* of Paffenhausen. A new*mikvah* and synagogue were built in town in the seventeenth century, prior to the expulsion of the Jews in 1671, when the Jewish community relocated to Pfaff.

The Kissengen region, now Bad Kissengen, must have had some Jewish residents during the Thirty Years' War, because there is a monument in the town hall to a bearded and helmeted man who is purported to be a Jew who helped in the defense of the town against the Swedes by casting bullets that never missed their mark. There are records of*schutzjuden* in the region; in 1650 and again in 1656, the butchers of Kissingen complained about competition from Jews living in the region.

Neustadt an der Saale, now Bad Neustadt, had a Jewish community at the time of the Black Death, as recorded in the*Memorbuch* of Nürnberg. I can find no evidence of Jewish settlement in the seventeenth century.

Saxon communities

Saxony in general had few Jews; there was a general expulsion in 1559 that included the Jews of Thuringia. Jews were forbidden to live in cities, and only at the end of the seventeenth century were they were permitted to settle on the estates of the nobility. There may have been a few exceptions, however, and there is some evidence that some of the Jews expelled from the cities settled in rural areas. Most, however, would have fled to Poland.

Schmalkalden became the home to Rabbi Meïr ben Jacob Schiff in 1636, a noted scholar of Talmud, Kaballah and Torah. It is likely that he settled there with a small community, most likely a community invited to fill the vacuum created by the Thirty Years' War. Similar resettlements occurred in many Saxon communities after they had been depopulated by the war. In general, the nobility hoped that by settling *Shutzjuden* in their villages, they could increase their revenue flow.

Arnstadt expelled its Jews in 1496 and 1532, but there is evidence of two Jewish converts to Christianity in the seventeenth century, suggesting that some Jews must have been present in the region to convert.

Dessau allowed Jewish settlement in 1621, but this community was destroyed in the Thirty Years' War.

Leipzig banished its Jews in 1439, but starting in the mid fifteenth century, while no Jews were allowed to settle there, Jews were important participants in the Leipzig fairs. These were held twice yearly at Easter and Michaelmas. Statistics on Jewish participation at the fairs dates back to 1675, by which time, hundreds of Jewish merchants participated, many from outside Germany.

An Academic Question

Suppose that, in the spring of 1631, the town of Grantville, West Virginia, was plunked into the Thueringerwald. When would the first Ashkenazi Jews arrive? For the sake of this discussion, I will ignore what is said in the novel*1632* and focus on the Jewish and larger worlds of the period. One thing is clear, and that is that the winter of 1631-32, with the passage of the war down the Main valley to

Frankfurt, would have let loose a flood of refugees; it also seems clear that some part of this flood would have been likely to end up in Grantville, since by that time, it would be fairly well known that Grantville treated refugees well and was genuinely serious about nondiscrimination. Here, though, I am not interested in the time of the arrival of the peak of this flood, but rather, the arrival of the first scattered Ashkenazic refugees.

Consider what the Jews of the lower Main valley knew in the spring of 1631. Taxes were extremely high everywhere in German lands, with the Jew-taxes even higher. Trade was at a standstill, inflation was out of control, and most of the Jewish community had recent memory of war, starvation or disease. There was excellent reason to leave. Lands under French rule to the east were relatively stable and home to an established Jewish community, but they were not anxious to accept poor Jewish refugees. Amsterdam was in a state of near perpetual war fending off the Spanish, but it was a haven to Jews. Some Jews were certainly traveling to these lands to the north and west.

Poland was another interesting destination. With the withdrawal of Gustavus Adolphus, Poland was largely at peace. The system of Jewish self-government was functional, so that, although there were Jew taxes, they were administered in a relatively fair manner. As a result, in early 1631, Poland would have looked very attractive.

For a Jew from Frankfurt or Aschaffenburg contemplating the journey to Poland, there would be several obvious routes. By Passover, everyone in Frankfurt would have heard that Gustavus was on the move west of Berlin and that the Imperial army was besieging Magdeburg. Travelers would therefore avoid the route north of the Franconian highlands and the Thueringerwald. The middle route, up the Fränkische Saale river would be direct, requiring crossing through the Thueringerwald, but putting the travelers on the road to Leipsig, while a southern route via Prague would be longer but probably safer.

The middle route would be likely to attract at least some Jewish travelers in the spring of 1631, with some travelers from as far south as Würzburg likely to come this way. The economic appeal of travel through the hills of the Spessart and Thueringerwald might have been significant, since both were centers of mining and industry. The entry of new traffic along this route would stop as soon as news of the fall of Magdeburg arrived, since at that point, the Imperial troops moved south and travel across the southern Saxon plains would have become far too dangerous.

Fast travelers from the lower Main valley, those on horseback or able to afford carriages, would likely manage about 20 to 30 miles a day. If we assume they travel to the east in the week after Passover, they would have passed the Ring of Fire before it happened. Once past, the news of the Ring of Fire would catch up with them only slowly, and if they did hear the news, they would be unlikely to turn back. With good transportation, they would be in a position to flee any soldiers they encountered, so they would likely make it to Poland and would be unlikely to arrive in Grantville.

Slow travelers from Frankfurt and fast travelers leaving later are another story. If we assume travelers on foot or with slow carts for their baggage, they will make from ten to twenty miles a day. Travel would be even slower if they are subsisting off the land within the limits imposed on Jews by Christian law, for example by buying rags and scrap metal to sell to the paper mills and iron foundries along the way.

That from one to three such slow-moving groups would pass through the upper Fränkische Salle valley at about the time of the Ring of Fire, hearing rumor both of the fall of Magdeburg and of the Ring of Fire at some point between Neustadt and Hildburghausen seems not only plausible but likely.

This news would drive them to veer south to avoid Tilly's mercenaries on the Saxon plains and to avoid the new and strange city of Grantville. Working through this schedule suggests that such groups would

encounter rumor of the "court Jews" of this new community as they began their dodge to the south, and news that Grantville was actively recruiting refugees and attempting to impose law and order on its little corner of the world could easily reach them as they were about a day's travel from Grantville.

The most likely avenue of approach for such a refugee group would be down the Schwarza valley, which would bring them to the border of the Ring of Fire sometime not too long before or after*Shavuos* . The festival would force them to camp in one place for a minimum of three consecutive nights, no matter what, and this camp will be either in Grantville, for example, at the refugee camp just being built near the power plant described by the novel*1632* , or not too far outside the ring if they are on a somewhat later schedule. However this develops, by the end of*Shavuos* , they will have heard detailed accounts of the arrival of bands of mercenaries in the plains to the east, and there is a high likelihood that they would elect to stay in the Grantville region.

The interaction between these refugees and the new town of Grantville will be interesting, although an author contemplating writing such a story must solve the problem of including these Jews in the population of Grantville without their coming afoul of the established canon for this series.

Resources for Writers

Those considering writing Jewish characters into their fiction should consult a Jewish calendar for the year they are writing so they can keep their characters' behavior in line with the Jewish liturgical year. There are excellent interactive web sites that will generate custom calendars for any year.

http://www.hebcal.com/hebcal/

http://www.hebrewcalendar.net/

These calendars all show holidays, fast days, and the Torah portion for each Sabbath, as well as the connection between the Jewish and Gregorian dates for that year. It is worth noting that all Jewish months begin with the new moon, so the fourteenth of the month is always a full moon.

If your Jewish characters are moderately observant, they might study the Torah portion for the coming week. If you want to know what pithy biblical quotes they are likely to come up with, read the relevant Torah portion. Ask for the weekly*sedrot* to be included in a calendar generated by the Hebcal web site listed above, and then click through from the calendar to the biblical text and commentaries from several rabbinical organizations.

Look up the history of the Jewish communities of each nonfictional town that is visited. The*Jewish Encyclopedia* , published in 1901, is entirely available on-line and has well researched entries on the Jewish communities of the world, including many small German communities.

http://www.jewishencyclopedia.com/

The web site includes a search engine but it is sometimes slow. Unfortunately, for those interested in German cities, there are multiple ways to enter text containing diacritical marks, and as a result, searching for city names containing umlauts is not always easy.

Many German cities have their own historical web sites that also contain a wealth of information. True gems can be found by blind searching with Google. Try searches on the word Jews or Juden plus the city

name in question; these will frequently find the*Jewish Encyclopedia* entry where the built-in search engine did not because Google is much smarter about umlauts.

The Jewish Theological Seminary library has an extensive web site that includes several exhibits that pertain to this era. Their exhibit on culture and costume and on the synagogues of Amsterdam includes some very useful material from the seventeenth century.

http://www.jtsa.edu/library/exhib/pastexhib.shtml

There are a few extraordinarily good works of fiction that portray Jewish life not too far before this era remarkably well. Francis Sherwood's*The Book of Splendor* , set in the Prague of Rudolf II (1601), does a good job of painting the Jewish community of that time and place in relationship to the larger community. Richard Zimler's*The Last Kabbalist of Lisbon* paints an intriguing picture of the Sephardic community of Lisbon in the era when the inquisition was on the rise and Jews faced the choice of fleeing or going underground.

IMAGES

Note from Editor:

There are various images, mostly portraits from the time, which illustrate different aspects of the 1632 universe. In the first issue of the*Grantville Gazette,* I included those with the volume itself. Since that created downloading problems for some people, however, I've separated all the images and they will be maintained and expanded on their own schedule.

If you're interested, you can look at the images and my accompanying commentary at no extra cost. They are set up in the Baen Free Library. You can find them as follows:

1) Go to www.baen.com
2) Select "Free Library" from the blue menu at the top.
3) Once in the Library, select "The Authors" from the yellow menu on the left.
4) Once in "The Authors," select "Eric Flint."
5) Then select "Images from the Grantville Gazette."

Submissions to the magazine

If anyone is interested in submitting stories or articles for future issues of the*Grantville Gazette,* you are welcome to do so. But you must follow a certain procedure:

1) All stories and articles must first be posted in a conference in Baen's Bar set aside for the purpose, called "1632 Slush." Do*not* send them to me directly, because I won't read them. It's good idea to

submit a sketch of your story to the conference first, since people there will likely spot any major problems that you overlooked. That can wind up saving you a lot of wasted work.

You can get to that conference by going to Baen Books' web site www.baen.com. Then select "Baen's Bar." If it's your first visit, you will need to register. (That's quick and easy.) Once you're in the Bar, the three conferences devoted to the 1632 universe are "1632 Slush," "1632 Slush Comments," and "1632 Tech Manual." You should post your sketch, outline or story in "1632 Slush." Any discussion of it should take place in "1632 Slush Comments." The "1632 Tech Manual" is for any general discussion not specifically related to a specific story.

2) Your story/article will then be subjected to discussion and commentary by participants in the 1632 discussion. In essence, it will get chewed on by what amounts to a very large, virtual writers' group.

You do*not* need to wait until you've finished the story to start posting it in "1632 Slush." In fact, it's a good idea not to wait, because you will often find that problems can be spotted early in the game, before you've put all the work into completing the piece.

3) While this is happening, the assistant editor of the*Grantville Gazette,* Paula Goodlett, will be keeping an eye on the discussion. She will alert me whenever a story or article seems to be gaining general approval from the participants in the discussion. There's also an editorial board to which Paula and I belong, which does much the same thing. The other members of the board are Karen Bergstralh, Rick Boatright, and Laura Runkle. In addition, authors who publish regularly in the 1632 setting participate on the board as*ex officio* members. My point is that plenty of people will be looking over the various stories being submitted, so you needn't worry that your story will just get lost in the shuffle.

4) At that point—and*only* at that point—do I take a look at a story or article.

I insist that people follow this procedure, for two reasons:

First, as I said, I'm very busy and I just don't have time to read everything submitted until I have some reason to think it's gotten past a certain preliminary screening.

Secondly, and even more importantly, the setting and "established canon" in this series is quite extensive by now. If anyone tries to write a story without first taking the time to become familiar with the setting, they will almost invariably write something which—even if it's otherwise well written—I simply can't accept.

In short, the procedure outlined above will save*you* a lot of wasted time and effort also.

One point in particular: I have gotten extremely hardnosed about the way in which people use American characters in their stories (so-called "up-timers"). That's because I began discovering that my small and realistically portrayed coal mining town of 3500 people was being willy-nilly transformed into a "town" with a population of something like 20,000 people—half of whom were Navy SEALs who just happened to be in town at the Ring of Fire, half of whom were rocket scientists (ibid), half of whom were brain surgeons (ibid), half of whom had a personal library the size of the Library of Congress, half of whom . . .

Not to mention the F-16s which "just happened" to be flying through the area, the Army convoys (ibid), the trains full of vital industrial supplies (ibid), the FBI agents in hot pursuit of master criminals (ibid), the .

. .

NOT A CHANCE. If you want to use an up-time character, you*must* use one of the "authorized" characters. Those are the characters created by Virginia DeMarce using genealogical software and embodied in what is called "the grid."

You can obtain a copy of the grid from the web site which collects and presents the by-now voluminous material concerning the series, www.1632.org. Look on the right for the link to "Virginia's Up-timer Grid." While you're at it, you should also look further down at the links under the title "Authors' Manual."

You will be paid for any story or factual article which is published. The rates that I can afford for the magazine at the moment fall into the category of "semi-pro." I hope to be able to raise those rates in the future to make them fall clearly within professional rates, but . . . That will obviously depend on whether the magazine starts selling enough copies to generate the needed income. In the meantime, the rates and terms which I can offer are posted below in the standard letter of agreement accepted by all the contributors to this issue.

Standard letter of agreement

Below are the terms for the purchase of a story or factual article (hereafter "the work") to be included in an issue of the online magazine*Grantville Gazette,* edited by Eric Flint and published by Baen Books.

Payment will be sent upon acceptance of the work at the following rates:

1) a rate of 2.5 cents per word for any story or article up to 15,000 words;

2) a rate of 2 cents a word for any story or article after 15,000 words but before 30,000 words;

3) a rate of 1.5 cents a word for any story or article after 30,000 words.

The rates are cumulative, not retroactive to the beginning of the story or article. (E.g., a story 40,000 words long would earn the higher rates for the first 30,000 words.) Word counts will be rounded to the nearest hundred and calculated by Word for Windows XP.

In the event a story has a payment that exceeds $200, the money will be paid in two installments: half on acceptance, and the remaining half two months after publication of the story.

You agree to sell exclusive first world rights for the story, including exclusive first electronic rights for five years following publication, and subsequent nonexclusive world rights. Should Baen Books select your story for a paper edition, you will not receive a second advance but will be paid whatever the differential might be between what you originally received and the advance for different length stories established for the paper edition. You will also be entitled to a proportionate share of any royalties earned by the authors of a paper edition. If the work is reissued in a paper edition, then the standard reversion rights as

stipulated in the Baen contract would supercede the reversion rights contained here.

Eric Flint retains the rights to the 1632 universe setting, as well as the characters in it, so you will need to obtain his permission if you wish to publish the story or use the setting and characters through anyone other than Baen Books even after the rights have reverted to you. You, the author, will retain copyright and all other rights except as listed above. Baen will copyright the story on first publication.

You warrant and represent that you have the right to grant the rights above; that these rights are free and clear; that your story will not violate any copyright or any other right of a third party, nor be contrary to law. You agree to indemnify Baen for any loss, damage, or expense arising out of any claim inconsistent with any of the above warranties and representations.