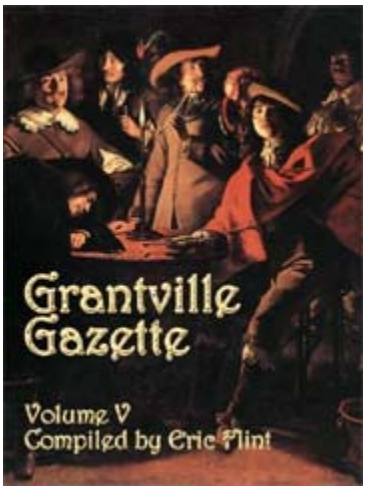
Grantville Gazette
Volume 5

Edited by Eric Flint



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Editor's Preface

By Eric Flint

Well—hallelujah—we managed to get Volume 5 of the *Gazette* out pretty much on schedule, about four months after the publication of Volume 4. As I said in my preface to that issue, I'm hoping to be able to maintain a triannual publication schedule for the magazine. We should be able to do the same, I think, with Volumes 6 and 7. We've already got all the stories and articles assembled for Vol. 6, and most of the ones we'll need for Vol. 7.

That said, most of the time involved in producing such a magazine is required by the editing and copy-editing process, which takes some time. Still, we should be able to get volume 6 out before the end of the year.

Some remarks on the contents of this volume:

As always, parsing the distinction between "regular stories" and "continuing serials" probably falls somewhere in the category of secularized medieval scholasticism. Just to name one example, Karen Bergstralh's "Of Masters and Men" is essentially a sequel to her "One Man's Junk," published in the last volume. But since there is—yet, anyway—no indication that she's going to be continuing this story, I chose not to put it in the category of continuing sequels.

Yes, you can argue the point. The fact remains that I'm the editor of the magazine and if say the number of angels who can dance on the head of a pin is 15,468,622, then—here, at least—15,468,622 it is.

Ultimately, this is probably a hopeless battle on my part for Literary Clarity. Hopeless, because as time goes on, it's becoming clearer and clearer to me that the assessment I made of the *Grantville Gazette* in my preface to Volume 4 is indeed correct. The *Gazette* is, indubitably, that most lowly and despised of all literary sub-genres.

To wit, a soap opera.

Look, let's face it. In the 1632 novels, you get—more or less—The Big Picture featuring the Stars of the Story. In the 1632 anthologies, you get basically more of the same, simply with a narrower and tighter focus and (often but not always) featuring a worthy character actor who gets his or her day to strut on the stage.

What do you get in the *Gazette*? All the shenanigans of everybody else, that's what. The damn spear-carriers, run amok. Slice of life story piled onto family sagas—functional and dysfunctional

alike—and all of it ladled over with a heavy scoop of personal melodrama.

I mean, honestly.

Who *cares*—just to name one example—if Karen Bergstralh's woebegone blacksmith gets around the oppression of the guild-masters and starts setting up his own successful business? Who *cares*—to name another example—if the pimply-faced American teenager in Jay Robinson's "Breaking News" wins the heart of the (hopefully not acne-ridden) teenage daughter of a downtime artist who is only remember by art connoisseurs?

(The mother, not the daughter—nobody except scholars remembers the daughter, for Pete's sake, until Jay dragged her out of historical obscurity.)

Shall I go on? Who *cares* if Velma Hardesty's daughters escape from the Horrible Mother's clutches, in Goodlett and Huff's "Susan Story"? Just to make it worse, from what I can tell about a dozen other writers seem to have become infatuated with Wicked Velma, and it looks like we'll be getting a small cottage industry cropping up of "Velma Gets Her Just Desserts" stories.

Sigh. Not *one* of these stories deals with Ye Big Picture. Not *one* of them fails to wallow in the petty details of Joe or Dieter or Helen or Ursula's angst-ridden existence.

Pure, unalloyed, soap opera, what it is.

Fortunately, before I start tearing my hair out over the Lit'rary Disgrace involved, my commercial instincts rally to the rescue. Because, while it is indeed true that soap opera gets no respect from the Illuminati, it's...

Well.

Wildly popular.

So, I brace myself. No, more. I find a peculiar sort of glee in contemplating the fact that a universe I originally created in order to explore some of the alternate possibilities for The Big Issues—democracy, religious tolerance, that stuff—has expanded to include a veritable spaghetti bowl of personal stories that have absolutely no function or purpose than to examine the multitude of ways in which the unwashed masses get about their lives under the changing circumstances.

It's a fitting full circle, I think. Let us not forget that, in the end, democracy is just a form of government—and the *only* purpose of government (legitimate one, anyway) is to enable the unwashed masses to get about their lives with a minimum of grief and anxiety. That way they can invent, discover, explore and wallow in their own hassles, instead of being saddled with somebody else's.

So, again, we venture into the 1632 soap opera. Hankies can be found on the coffee table, I believe. Yes, I know the guys won't need them. Shirt-sleeves will always do, in a pinch.

Eric Flint
August, 2005

STORIES

Breaking News

By Jay Robison

Rome, Italy, August, 1632

An apprentice escorted Artemisia Gentileschi into the stifling studio. She was expected.

"Maestra Gentileschi, my dear, how pleasant to see you!" Gian Lorenzo Bernini stood in the middle of his studio. The young sculptor's handsomeness was barely diminished by a layer of rock dust. Apprentices and journeymen worked busily on busts and other statuary.

"It is good to see you, Cavaliere," Artemisia Gentileschi said.

"Enough of this 'cavaliere' nonsense, Artemisia. We've known each other too long for such formalities."

"And we've known each other too long for me to believe you didn't know I was in Rome, Gian Lorenzo."

Bernini laughed. "You always did have the measure of me. You are correct of course; I knew of your arrival almost instantly. Come, let's sit on the balcony and talk. It will be more pleasant there."

Bernini motioned to the apprentice who'd shown Artemisia into the studio. "You! Bring wine for Maestra Gentileschi and myself." The young man scrambled to obey.

The two artists spent some time catching up. Gian Lorenzo Bernini was far more adept at making enemies than friends, but Artemisia Gentileschi was a friend. Though Bernini painted a little, it was working the stone that he loved, and Artemisia supposed that the main reason they got along was because the sculptor didn't view her as a rival for commissions. They were also both second-generation artists, a relative rarity. When small talk and nostalgia had run its course, Bernini decided to get to the heart of the matter.

"What is it that brings you to me, Artemisia? Surely not merely to pass an afternoon in conversation, pleasant though that may be."

Artemisia sipped her wine before answering. "I have come to seek your assistance in a matter, Gian Lorenzo."

"Is it money? I keep telling you that miser Philip doesn't pay you what you're worth."

"Money isn't everything," said Artemisia. This was an old argument between them. "There is no small amount of prestige to be had painting for His Most Christian Majesty. And he's not nearly so jealous a patron as His Holiness."

"Jealous Pope Urban may be, but he is generous. Extremely generous. If it is not money, then, what is it you need? And what makes you think I can help you and King Philip cannot?"

"You have heard of this new town in the Germanies? Grantville, I believe it is called."

"It is called Grantville," Bernini confirmed. "And it has been the subject of much talk in the papal court. Mostly rumors, and wild ones at that. Its inhabitants are proving most puzzling. They are allied with the Swede, yet by all accounts, there is a Catholic church in Grantville that flourishes alongside Protestant churches and even a synagogue. Its leaders have made no attempt to suppress the Church and even seem to tolerate the open presence of the Jesuits."

"The father-general must be pleased," Artemisia said. "However, it confirms what I have heard, that Grantville is a place of freedom and possibilities."

"You seek to go there?"

"No. I want to send Prudentia there. Facts about Grantville are hard to come by, but it seems that women are not barred from advancement merely because they are women. It will be good for her development as a painter and as a person."

"This, from the only female member of the Florentine Academy of Design?" Bernini's feigned shock was intentionally theatrical.

Artemisia was not in a joking mood, not about this. "You know as well as I what I've had to go through. And you also know that Rome is a snake pit for an artist."

"True enough," said Bernini in a more serious tone. The sculptor didn't even try to deny Artemisia's statement. How could he deny it when he was the snake pit's most poisonous viper?

"I believe I can do as you ask. In fact, there is a most suitable traveling companion for young Prudentia with plans to depart for Grantville very soon."

"Thank you, Gian Lorenzo. I am in your debt."

"Yes, you are. And don't think I will let you forget it."

Grantville, October 7, 1633

James Byron "Jabe" McDougal was having a hard time concentrating on this week's selection for the Grantville "Dinner and a Movie" club. It wasn't because of the selection. *Doctor Strangelove* was one of his favorites. No, it was Prudentia Gentileschi that was the distraction. From Jabe's point of view, practically everything about the fifteen-year-old shrieked: "out of your league!" She was beautiful—Jabe thought she was, anyway—she was smart, she was funny . . .

She was even famous. At least, her mother was famous, if you knew anything about art. Artemisia Gentileschi painted for cardinals, dukes, even kings.

Tonight's meeting was at Stephanie Turski's house. The group had grown out of an informal advisory committee brought together by Janice Ambler when Janice found herself programming

director of the one and only working television station in the seventeenth century. The group still served an advisory function, but had evolved. As Janice firmed up programming hours and policies of the station—it had been christened WVOA-TV and the name had stuck—Dinner and a Movie became more of a group to watch and discuss films that didn't have broad enough appeal to merit a showing on WVOA.

Membership was fluid but there was a steady core of regulars in addition to Janice and Stephanie: Amber Higham, Eric Hudson, Ev Beasley, and Lorelei Rawls were all film buffs, and Father Mazzare and Reverend Jones came when they had the time. Balthazar Abrabanel, fascinated by the medium, also came when his health permitted and his medical duties didn't interfere; and Prudentia Gentileschi. Prudentia had been schooled in painting since she was old enough to hold a brush, and if her mother knew how well Prudentia could hold forth on the use of light and shadow in composing film shots, Artemisia would have been proud indeed. Her perspectives on this uniquely up-time art form were always surprising.

The discussion of *Dr. Strangelove* was winding down when the phone rang. Stephanie answered and handed the phone to Jabe. It was the duty officer at the barracks. Jabe was ordered to return as quickly as his feet could get him there.

"Sorry, everybody," Jabe said. "I need to go."

"I need to go as well," said Prudentia, in her heavily accented English. "Signor Nobili does not like me to be out late."

"I'll take you there," said Jabe. "You shouldn't walk alone."

Prudentia's responding smile had an undertone that embarrassed Jabe a little. Mostly because he was quite sure she wasn't fooled at all. In point of fact, Grantville's streets were quite safe, even at night—and Prudentia knew it just as well as he did.

However . . . She didn't seem to mind.

Prudentia's arrival in Grantville had been overshadowed, first by Mazarini's visit and then by the Croat raid and its aftermath. Artemisia Gentileschi wasn't a household name in a town like Grantville, certainly, but Father Mazzare had known who she was. So had Balthazar Abrabanel. He had recalled some rumors that Prudentia's grandfather Orazio had relocated to England from his native Rome, but if that was true Balthazar had never crossed paths with the man.

Before long, Prudentia Gentileschi was a minor celebrity—much to her embarrassment. Living arrangements were soon made, with Tino Nobili agreeing to provide lodging. Though Artemisia had wanted her daughter to be educated in Grantville, it was soon determined she already had an education which surpassed almost all Grantville's down-time citizens, and more than a few up-timers as well. In the end, Prudentia became a part-time student, mostly taking courses she chose for herself, and assisted the art and art history teachers in Grantville. In return for the latter, she was given a modest stipend to supplement the money her mother had sent with her.

Jabe and Prudentia spent most of the walk to the Nobili home in awkward silence, or even more awkward small talk. Jabe knew he was caught in the painful limbo between friendship and romance. The worst of that limbo, of course, being the fact that he had no idea if Prudentia felt the same way—and had no better idea how he might try to find out.

Even with an up-time girl, Jabe would have been too shy to try for a goodnight kiss, unless the girl was practically waving flags at him. With a down-timer like Prudentia, he didn't have a clue how he'd recognize a waving flag even if he saw one.

At the Nobilis' door, they bid each other good night. Jabe spent the walk to the barracks alternately cursing himself for blowing his chance with Prudentia—if there'd been one at all—and wondering what was going on.

* * *

At the barracks, Jabe had to fight his way through a gaggle of reporters surrounding Captain Henderson Coonce. Coonce looked more than a little resentful and Jabe didn't suppose he could blame him. The captain was in charge of basic training. No one had said anything to him about being a press liaison as well.

Normally Frank Jackson would be doing this, but Frank was in Magdeburg. The army had no officers above the rank of captain currently stationed in Grantville. That meant Henderson Coonce was the ranking army officer in town. That meant he had to deal with the press. Rank may have its privileges, but at the moment Captain Coonce was obviously thinking only of its curses.

"I'll tell you one last time," Coonce growled. "You'll have a brief statement *after* I tell my men what's going on. Anyone doesn't like that can leave right now, before you get an MP escort. And I ain't answering questions after the statement. We'll have more for you, soon as we get it."

Coonce meant to be intimidating and it mostly worked. It did not, however, work on Joe Buckley, who had the well-deserved reputation of being the most aggressive—some would say obnoxious—reporter in Grantville.

"Don't you think the public has a right to the news, Captain?"

Coonce looked like he wanted to use Buckley's guts for garters. "You think you're more important than the families, Buckley? They get told first."

Buckley, for a wonder, gave up pressing for answers. After the reporters started leaving, Jabe walked up to Coonce and came to attention.

"Took you long enough, Private," Coonce grumbled.

"Sir. I had to escort Miss Gentileschi back to the Nobilis' house, sir." Jabe stared straight ahead, still at ramrod attention. Someone other than Jabe could have seen the girl home, of course, if it had to be done at all, which it didn't. Fortunately, Coonce didn't pursue the matter.

"At ease, Private McDougal. You're not too late."

They went inside and Jabe found a seat in back with the other enlisted personnel. Officers and noncoms sat up front.

"This is gonna be short and sweet, people," Captain Coonce said. "Earlier today, the Danes tried to take Wismar. We turned 'em back and they took heavy losses. They cut and ran."

He let the cheers die down, then continued: "We took our own casualties, however. I can't tell you who yet, and that comes straight from the top. Things are dicey right now, but General Jackson will be flown back to Grantville, hopefully in the next couple of days. I imagine we'll all know more then. Dismissed."

With that, Henderson Coonce strode out to face the press once again. From what Jabe could catch from his muttered grumbles, the captain was expressing severe reservations concerning the wisdom of the Founding Fathers when it came to the much-overrated value of freedom of the press.

Magdeburg, October 8, 1633

Mike Stearns imagined that he looked like hell. He felt even worse. He hadn't gotten any sleep the night before and wasn't counting on getting much tonight. Mike had walked from the radio shack to his rooms so many times the last few days he could have made the trip in his sleep.

It may yet come to that, Mike thought. He stood up and stretched, stepping away from the radio. The radio window for the evening was now closed, and Mike could do no more here tonight.

He called for his escort for the evening. "Pete! I'm ready to head back."

Pete McDougal opened the door. "If you don't mind me saying so, you look like nine kinds of rough," he said.

"Ten kinds, Pete."

For the first few moments, they walked in comfortable silence. The two had been fellow UMWA officials in their local before the Ring of Fire and had known each other a long time.

Mike shook his head. "Medals don't seem like enough, Pete. I wish I could do more. If we were up-time these kids would have been all over TV. *Dateline NBC*, *Sixty Minutes*, the whole works."

After hearing Pete's response, Mike abruptly changed course, leaving Pete scrambling to keep up. "What a great idea! Let's go get Frank out of bed."

Grantville, October 10, 1633

Mike had hoped to have Jesse Wood fly Frank Jackson back to Grantville the day before, but things hadn't worked out quite that neatly. As Frank and Jesse touched down, the American general found himself, for once, a little grateful he was in the early modern world. At least, Frank thought, the thirty-minute news cycle was a thing of the past. Or future, depending on how you looked at it.

By now, it had been officially acknowledged that Eddie, Larry, Hans, and Swedish sailor Bjorn Svedberg had been killed in action at Wismar, but the situation in Magdeburg had not left time for the release of a detailed statement. Until now.

Frank found Henderson Coonce waiting for him at the airstrip, truck engine running. Coonce saluted, and they drove to the high school. Even if Frank had been vain enough to think his rank entitled him to a chauffeur with captain's bars, Henderson put paid to that notion by complaining the whole way. By the time they pulled up to the high school, Frank was ready to recruit an entire regiment's worth of press officers, just to shut Coonce up.

"If you don't want to wait, Captain, I'll ring when I'm done," said Frank.

"I can wait," said Coonce.

"I *said* you'd get your press officer."

Coonce smiled. "I heard you, Frank. Why do you think your ass ain't walking back?"

Military protocol in the new little United States still had a long way to go. Frank just shook his head and went into the school.

He found Janice Ambler and Jabe McDougal waiting for him. Jabe sprang to attention. Prudentia Gentileschi sat quietly in a corner, sketching something off of a television screen.

"At ease, Jabe. We're not in the barracks."

He went straight to the subject. "You still have all that video stuff you were doing after the Ring of Fire? That oral history project you were working on?"

"Sure, sir," replied Jabe. My tape's almost gone, though."

"Have you got footage of Eddie and Larry? Hans?"

Jabe nodded.

"Good. Can you put something together? By noon tomorrow?"

* * *

Jabe hesitated. He was only a self-taught video documentarian and even before the Ring of Fire he was far from certain he'd wanted to make a living making movies of any kind. Jabe had thought of his video projects as little more than a hobby.

But it was a serious hobby, so Jabe knew that the rule of thumb for editing footage was that one hour's work yielded one minute of usable footage. Cutting hours of footage down to sixty minutes in less than a day?

Insane.

For this, though, Jabe couldn't say no. "You'll have it, sir, Ms. Ambler. It'll be ready."

"Would you mind if I observe you?" Prudentia had been so quiet her presence had been forgotten.

Jabe crimsoned. "Sure, Prudentia. I wouldn't mind."

Frank told Jabe he would clear the young man's absence from the barracks. All of Jabe's video gear was at his house, in his old basement room. Frank continued to talk to Janice; his statement would be simulcast on VOA radio. Jabe and Prudentia left.

Jabe was preoccupied enough not to be nervous around Prudentia—at least not nearly as nervous as he usually was. Without even thinking, he broke the ice.

"What were you sketching, Prudentia?" he asked.

"A scene from *Dr. Strangelove*. General Ripper sitting at his desk, looking at his cigar. A lot of interesting play with light and shadow. It would, I think, make a good painting."

Without wanting to, Jabe blurted out the question that had really been bothering him. "Why did you want to come with me?"

"I grew up around artists, you know. I love to watch them work. I find it very inspirational for my own art."

"I'm not an artist."

"It may be so, but from my understanding of this *Orbis Incindiae* it is unlikely I shall ever see an artist in this medium of film, not anytime soon. Besides," she added, "you have a good eye and good sense of the beautiful."

Jabe flushed. Hastily, he decided the best course of action would be to shift the conversation away from himself. "How have you liked Grantville? It must be a lot different than the places you've lived."

"It is. I miss Napoli and Roma, but Grantville is a fascinating place. And the things I've learned, especially about the science of optics and behavior of light, have been magnificent. It's been most useful to me. But your beliefs and customs are rather shocking. Mother would not approve of me walking home with you."

"Why not? It's not like we're going to, you know, um, well . . ." That sentence trailed off into confused oblivion.

Prudentia smiled. "I trust you, Jabe. It's just that my mother's experience with men, especially when she was young, has led her to be . . . wary."

* * *

The McDougal house was empty, save for the dogs. Zula McDougal was still at work, Karin Jo and Kyle were still at school.

Hatfield, Llewellyn, and Dottie greeted Jabe with their usual enthusiasm. Hatfield, a golden retriever-husky mix, made his usual strange Chewbacca noises, with Llewellyn—Lew, for short—and Dot, both Pembroke Welsh corgis, adding to the din with their barking. Hatfield had been adopted from a shelter. Lew and Dot were originally only going to stay with the McDougals for a short time, until they found homes, but the Ring of Fire had made them permanent residents. Jabe's younger brother Kyle was trying to train the dogs to do useful work.

Jabe gave Hatfield a quick tummy rub and then scribbled a note, leaving it on the table where the first person home would see it. Prudentia phoned the Nobilis. Jabe escorted his guest to his basement room. He had originally shared a room with Kyle until the two brothers decided that absence would make the heart grow fonder and Jabe fled to the basement. It could get damp and chilly down there, especially since the Ring of Fire, but Jabe was more than willing to sacrifice a few comforts for privacy.

Jabe turned on his computer and pulled an extra chair up to the desk, while he looked through his tapes and got his camera.

* * *

Prudentia admired Jabe's computer, caressing its curved lines. She had seen many computers since coming to Grantville and they usually struck her as ugly in their design, even if they were quite useful things. This one was different, though. It seemed to have been designed by someone with a true artistic sense.

"Pretty, isn't it?" said Jabe as he sat down and began connecting his camera to his computer. "I've always loved Macs. I saved up for three years to buy this one, and the video stuff. 'Course, Eric Hudson helped me get the camera. He knew a guy in Morgantown who wanted a better one and was selling this one cheap."

Prudentia was less interested in Jabe's tools than his motivations, his inspirations. "Why do all this?" she asked.

Jabe reflected for a moment. "After the Ring of Fire, I got to thinking about how we were going to remember it. You know, what the history books would say. I got to thinking, well, I should talk to people in Grantville about the Ring of Fire. Get their memories of it before too much time passed so we wouldn't forget. I figure one of these days I'll watch all the interviews again, write the words down. Do a book."

Prudentia nodded. "So, then, why do you have extra on the soldiers?"

In the world Prudentia grew up in, mercenaries and prostitutes were below even actors in social rank. Even after a year in Grantville, she was still often uncomfortable with the Americans' peculiar notions of status and social mobility. She was grappling with her attitudes, though, and could see advantages to the way the Americans did things. After all, hadn't she been sent here because of that? Her mother Artemisia had fought against established customs her whole life, and wanted something different for her daughter. Prudentia was eager for any new insights.

Jabe didn't answer immediately, as was his habit when thinking about an issue.

"In the up-time United States," he said slowly, "we called ourselves a land of opportunity. We told ourselves that you could start with nothing and that if you worked hard enough, if you took advantage of the chances God gave you, you could be whatever you wanted. No matter who your parents were, or where you were from. I wasn't old enough to vote right after the Ring of Fire, but I remember Dad saying that's why everyone backed Mike—President Stearns. Because he said we could only survive if we kept on being Americans."

"But why were the Richters special? They weren't even born in your up-time United States."

"Because they were proof that the ideas we'd grown up with would work here. Gretchen was a camp follower but given the chance, she became an important leader. Her grandmother married Mayor Dreeson and started a school. I remember Hans told me he only became a soldier for Tilly because he had to. But he joined the Air Force because he wanted to. That made all the difference to him. The Richters are what we would have called an 'All-American Tale.'"

Prudentia watched Jabe work and thought about what he'd said. She'd liked Jabe from the beginning, to the point of finding his awkwardness around her sweet. What Prudentia liked most about the young American was that he listened and thought before speaking. This was new to Prudentia; though, from talking to up-time girls, it seemed to be an unusual male trait from their viewpoint as well.

Prudentia was not sure what her relationship with Jabe would evolve into, if indeed it evolved into anything. But she was more than interested enough to find out.

So, as they worked in companionable silence, she was grateful for the friendship and presence of Jabe, and she knew he felt the same way about her. Jabe was soon absorbed in his work and Prudentia began sketching him in the pad she always carried with her.

Both young people were surprised when Zula McDougal announced dinner. Jabe's mother seemed glad enough to have her oldest son back for the evening. Working for Ollie Reardon and riding herd on Karin Jo and Kyle kept her busy enough, Prudentia knew, but with Pete in Magdeburg and Jabe living out of the house most of the time, she imagined the place did feel empty to the woman.

Zula fussed over Prudentia, much to the young woman's embarrassment, and continually apologized for the simple meal. Jabe explained to his mother what he needed to do.

"I'll leave you to it, then," Zula said. "I can bring coffee down later."

"Thanks, Mom. That'd be great." Jabe said.

"Yes, thank you, Signora McDougal. You are a most gracious hostess."

It was Zula McDougal's turn to blush then. Prudentia thought it was a most charming hereditary trait.

"You're welcome. Call me Zula, please."

* * *

Once again, after dinner, Jabe lost all sense of time. The documentary seemed to be going well, and he thought might be able to pull this off after all. Jabe was glad that he was so meticulous about logging his footage, because he didn't have to waste a lot of time watching tape he'd shot that wouldn't have anything to do with his present project. He smiled to himself. He'd been called "anal-retentive" more than once, but if Jabe weren't so exact he'd never be able to do what he was doing right now—cramming sixty hours' work into a night.

* * *

As Prudentia watched Jabe work, she remembered Alfonso, a master sculptor she'd loved to watch working when she was a young girl in Rome. The old man hadn't been terribly famous, and hadn't been good enough to attract commissions from the leading families. Still, Alfonso was sufficiently skilled to work for wealthy merchants and petty nobles and had a steady income. In any event, it wasn't the ability of the artist that had impressed Prudentia. It was the obvious passion Maestro Alfonso had for his work that remained in her memory.

Old Alfonso would spend hours, sometimes days, just studying a block of stone. He would touch it, even talk to it. When at last he touched chisel to stone, the sculptor considered each stroke with care, until the object emerged, as if the stone were slowly giving birth to it. She watched Jabe as he would replay a few seconds of video over and over, taking just what he wanted from each clip. Sometimes Jabe would shave off the tiniest increments of time from a piece of footage, just like Maestro Alfonso with his precious marble blocks.

"A sculptor, but of reality," murmured Prudentia Gentileschi. She wondered what her mother would think about that.

"Hmm?" Jabe asked. He stood up from his chair, stretching.

"You remind me of a sculptor I used to watch as a child, in Rome. It struck me that you are a sculptor, but of reality rather than stone."

"I told you, Prudentia, I'm no artist."

Prudentia Gentileschi knew she did not fit the clichés—at least the twentieth century clichés—of the temperamental artist. She didn't hang around in smoky cafes and wear black turtlenecks, nor did she act like a diva, in the sense up-timers would have meant. Prudentia was not a particularly somber young woman. Now, though, she fixed Jabe with a very serious stare.

"You are an artist, Jabe McDougal. I've been watching you all night long. You have the soul of a true maestro."

"I've never thought of it that way. Thank you, Prudentia, very much. I can't tell you how much that means to me, coming from you."

They looked at each other for what seemed like forever. Prudentia did not know how to handle this moment. Obviously enough, despite being several years older, neither did Jabe.

Finally, Jabe looked outside, through the basement window. "Good grief, is that the sunrise?"

Prudentia was also surprised. "So it is. How is it coming?" she asked, nodding toward the computer.

"Done, or nearly so. It'll run for one hour. I just need to put some music on it, make sure all the audio's okay, and put it on a VHS tape. I should be able to get it to Ms. Ambler just in time." Jabe yawned so wide his jaw cracked.

"It's time for more coffee," said Prudentia. "I'll get us some."

* * *

While Prudentia did battle with the McDougals' battered Mr. Coffee, Jabe eyed his CD shelf critically. Verve Pipe's "Bittersweet Symphony" was a given, and he thought Barenaked Ladies' cover of "Lovers In a Dangerous Time" would work for the section about Hans and Sharon's relationship. Some quieter pieces of classical music, along with R. Kelly's "I Believe I Can Fly," rounded out the soundtrack.

Grantville, October 11, 1633

Janice Ambler was starting to panic. It was ten minutes till noon and Jabe still hadn't shown up. Janice's mentor had worked at a TV station in the early days of live television and had told her often of what it took to play the live programming produced in New York for a west coast audience three hours behind. The shows were broadcast over phone lines, projected, and filmed with a kintescope. The film was rushed to the lab, developed, and rushed back to the studio by motorcycle courier. Janice wondered if her old friend had felt what she was feeling now—and, if so, how he had avoided getting ulcers.

Pacing in front of the high school's front door, Janice heard Jabe before she saw him. A farmer driving his horse cart into Grantville had given him a ride. Prudentia Gentileschi was with him. Jabe handed Janice the tape. The tirade she'd been working up evaporated in a second as soon as she saw the young man; he'd obviously been working through the night.

"Sorry to cut it so close, Ms. Ambler. Had to make sure this one was as perfect as I could make it."

"Jabe, no offense, but you look like hell. Hello, Prudentia."

Prudentia inclined her head in acknowledgement. "What Jabe won't tell you, Signora Ambler, is that sunrise came as quite a surprise. And then he had to watch the finished product at least twice more to make further changes. An artist indeed."

"Yeah, look, I've got to get this into the studio and then get Frank on the air. You two are welcome to watch if you want." Jabe and Prudentia followed Janice to the studio.

Frank Jackson looked like he hadn't gotten a moment's sleep, either. But he refused more than minimal makeup. Jabe thought it was too bad more up-time politicians hadn't had the sense to know that there was a time to look *un*photogenic. Jabe thought that if they had, politicians would have been a lot more respected up-time than they actually were.

Janice double-checked the patch to the VOA radio transmitter, then motioned to Frank. He looked into the camera.

"I have been asked to read the following statement on behalf President Michael Stearns, as well as Emperor Gustav II Adolph of the Confederated Principalities of Europe:

"On October 7, 1633, forces of the United States Navy and United States Air Force, charged with defending the port of Wismar, engaged a Danish naval force intent on capturing that strategic port. Through the bravery of the defenders, the Danes were turned back, suffering significant losses.

"We suffered our own significant losses. Lieutenants Edward Cantrell and Lawrence Wild of the United States Navy were killed defending Wismar, as was Able Seaman Bjorn Svedberg of the Swedish Royal Navy. Air Force Captain Hans Richter continued to press the attack, and was seriously wounded. Rather than attempt to save himself, Captain Richter destroyed the Danish warship *Lossen* by crashing his aircraft into the ship."

Frank paused for a moment to collect himself. He continued:

"President Stearns has said that out of the sacrifice of these four young men, a new order is being born in Europe. The Distinguished Flying Cross is being awarded to Captain Richter and the Navy Cross and Silver Star for Lieutenants Wild and Cantrell, and Seaman Svedberg. The President had told me that he also intends to ask the legislature to approve a new Congressional Medal of Honor. If it's approved, he will ask that it be awarded to Captain Richter.

"President Stearns has also asked me to announce that he will be resigning as President of the New United States to accept the office of prime minister in a new nation to be called the United States of Europe. I will be resigning as Vice President to better serve as a staff officer under General Lennart Torstensson. Both these resignations will become effective as soon as arrangements for the new USE are finalized. Thuringia and Franconia will become a province of the USE, assuming that's approved by the population in a special election. Ed Piazza will become Acting President until those elections are held."

A baffled almost-smile crossed Frank's face. "I know a lot of things are up in the air, folks, but we'll keep you informed."

Frank shuffled his papers. He looked into the camera, eyes bright with tears. "There's nothing worse than having to sacrifice our young people to war. Especially fine young men from our own town like Hans Richter, Eddie Cantrell, and Larry Wild. But in the years to come, they will be remembered as heroes by those who find they have choices, when they didn't have any before. They didn't die for nothing, folks. I can promise you that much."

* * *

Jabe's documentary faded in, telling the story of three young men left suddenly alone in a completely unfamiliar world, making their way. A young German printer's apprentice who only wanted to be free to choose, and who chose to fly. Who gave his life to protect the people who had taken in him and his family; not because he was forced to, but because he wanted to. As the documentary ended, an hour later, Jabe knew he'd done something truly special.

"A masterpiece," murmured Prudentia.

"Probably the only one I'll ever do. It'll be a real long time before we can make digital camcorders again."

"Perhaps. You may find another way to do the same. If not . . ." She shrugged. "Every true artist should produce at least one great piece, and art is more valuable when it's one of a kind. Shall we have breakfast in the cafeteria?"

At the moment, the only thing Jabe wanted more than a meal with Prudentia was sleep. "Make it dinner at the Thuringen Gardens. I've got to sleep."

Prudentia laughed. "It is—how do you say?—a date."

Jabe and Prudentia walked out of the studio, out of the school, into the daylight. Prudentia gave Jabe a kiss on the cheek and all the way back to the barracks, Jabe didn't think his feet touched the ground. The story of how Jeff Higgins and Gretchen Richter had met hadn't taken long to make the rounds, and it reinforced the vague idea Jabe had had that you impressed a woman you liked by being the gallant knight. Jabe certainly hadn't saved Prudentia Gentileschi from rape and a life as a camp follower, but he knew that he'd impressed Prudentia very deeply, nonetheless. That he'd done so unconsciously, just by being himself and doing his best, made that knowledge all the sweeter.

* * *

When she got to her home, Prudentia found that she couldn't sleep. The Nobili family had cleared part of a room for her to use as a studio, and Prudentia went there instead of her bedroom. A blank canvas stood on an easel. She had spent weeks preparing that canvas and now she burned to paint on it. But what?

Prudentia flipped through her sketch book. She saw the sketch she'd made from the *Dr. Strangelove* scene; that would make a good piece but it didn't feel right, not for this.

Then she turned the page. She smiled, and began sketching outlines on her canvas.

* * *

Many months later, when Artemisia Gentileschi was able to make her first visit to Grantville, Prudentia shyly showed her the end result, which hung in the McDougal home.

Sculptor of Reality, she called it. A portrait of James Byron McDougal at work on his computer.

Artemisia studied it for quite some time, and smiled. "The Gentileschis have a third generation of artists, my daughter. We've done the Berninis one better."

Ounces Of Prevention

By Kim Mackey

When Pieter Paul Rubens entered the Brussels' home of fellow diplomat Alessandro Scaglia he was surprised to find his friend and patron, Nicolaas Rockox of Antwerp, deep in conversation with the *abate*.

"Nicolaas," said Rubens, clasping his friend's arm as Rockox and Scaglia rose to greet him, "I didn't know you were acquainted with Alessandro."

Scaglia smiled and motioned for Rubens to take a seat next to him. "We do share an affinity for Flemish painters. Don't we, Nicolaas?"

Rockox laughed. "Indeed we do. And since Pieter has been much occupied with the cardinal-infante's diplomatic missions, we have had to look for new artists to patronize, haven't we?"

"Actually Pieter," said Scaglia, "Nicolaas is assisting me in the purchase of a house in the Keizerstraat in Antwerp and decided to visit when he learned that Anthony Van Dyck had returned from London. You know I've always been partial to Van Dyck's work."

Scaglia sat back in his chair and his eyes sharpened. "But that is why Nicolaas is here. A more interesting question I think is why are you here, Pieter? Is that abominable siege of Amsterdam over yet?"

Rubens sighed.

When the cardinal-infante had become the governor-general of the Spanish Netherlands both he and Scaglia had offered their services to the young Spanish nobleman. Like Rubens, Scaglia had extensive diplomatic contacts throughout Europe. Unlike Rubens, however, Scaglia was acknowledged as one of Europe's premier spymasters. Originally from Savoy, Scaglia had settled in Brussels when the pro-French duke Vittorio Amedeo I had ascended to the Savoy throne. Because the duke had not wished to offend Alessandro's elder brother, Augusto Manfredo, count of Verrua, Scaglia had been permitted to retain control of all three of his commendatory abbeys and pensions held in Savoy. Those, plus the abbey of Mandanici in Sicily that had been granted by the Spanish in 1631 as a gift for his services, had allowed him to maintain a sumptuous lifestyle in one of the best houses in Brussels.

What had especially attracted the cardinal-infante's attention, however, was the *abate's* antipathy for Richelieu. Throughout the 1620s, Scaglia had worked hard to develop extensive

diplomatic contacts in France and England for Duke Carlo Emmanuele I of Savoy. He had built an excellent working relationship with the duke of Buckingham in England and with many nobles of the French court, particularly those supporting the Protestant duc de Rohan and the queen mother, Marie de Medici. With the deaths of Buckingham in 1628 and Carlo Emmanuelle I in 1630, however, Scaglia had found himself out of favor, especially when he continued to push for the support of French Protestants as a counterweight to Richelieu's growing political power.

Like Scaglia, the cardinal-infante was apprehensive about French intentions regarding the League of Ostend and had encouraged Scaglia to maintain and broaden his contacts with the French exile community in Brussels and elsewhere. Scaglia had further cemented his relationship with the infante when his spies had uncovered a plot by leading Walloon noblemen, including the duke of Aerschot, to disconnect the Spanish Netherlands from the direct control of Spain and create a neutral territory at peace with the United Provinces. While several of the plotters had been arrested, others, including the duke, had not. That fact had intrigued both Scaglia and Rubens. It was clear to both of them that the cardinal-infante was interested in far more than being a simple creature of his older brother, the king of Spain.

Rubens waved his hand in dismissal. "Unfortunately not, Alessandro. The siege continues. The cordon is somewhat looser than it has been because the infante has had to send additional troops to Haarlem and Utrecht to put down riots and unrest by Counter-Remonstrants. The Arminians seem to be content enough with the infante's light-handed rule, but the anti-Catholic fanatics are not and continue to campaign against him."

A difficult knot to cut," mused Scaglia. "If he does not respond with force he emboldens the rebels, and if he uses too much force he makes them into martyrs for the cause."

"Precisely," said Rubens. "In this situation, maintaining adequate troop strength is a must—which brings me to the reason why I'm in Brussels."

Rubens took two manuscripts out of his valise and handed one to Scaglia and another to Rockox. For several minutes the men read with little comment beyond a mild exclamation or two.

When Scaglia was done he looked over at Rubens and smiled. "So let me guess. You have promised the infante that the wonderful mechanics and men of science of the Spanish Netherlands can make this elixir, this . . ." He glanced down at the manuscript again and pronounced the final word slowly and carefully. "Chlo-ram-phe-ni-col. Am I right?"

Rubens nodded. Scaglia looked over at Rockox. "Well Nicolaas, what do you think? The Acontians?"

"Perhaps," said Rockox dubiously. "But even then . . ." He shrugged. "There are too many unknowns here to say for sure. We need an expert's opinion."

Rubens cocked an eyebrow at Scaglia. "Acontians?"

The suggestion caught him by surprise. The Acontians were followers of Jacobus Acontius, an Italian Protestant from the last century who'd settled in England. He'd written *Satanae Stratagemata* in 1565 calling for the renunciation of violence in religious affairs. The Acontian society was established to further his ideas on religious tolerance and science. Rubens thought of them as similar to the Baconians; more tolerant and less dogmatic, yet more secretive. They were particularly strong in England and the Low Countries.

He knew who they were, of course, but he wouldn't have thought of them as being possibly helpful in this situation.

Rockox suddenly sat forward in his chair. "Ah, I remember now! I believe I know someone

who can help us. He would never admit his Acontian connections, but I know he has been very interested in the new science coming from Grantville. And he lives close by, in Vilvorde."

"Vilvorde?" said Scaglia. "Hmmm, is this the man who did the experiment with the tree?"

Rockox nodded. "Yes, Johann Baptista von Helmont. His wife, Margaret van Ranst, is a distant cousin of mine."

Scaglia glanced out the window, noting the position of the sun.

"Let's pay him a visit, shall we? Vilvorde is less than four miles away and it's time for my afternoon carriage ride anyway."

Rubens smiled. Perhaps this wasn't such an impossible fool's errand after all. Together the three men rose and walked towards the front door.

* * *

"What you ask is impossible, gentlemen," said Johann Baptista von Helmont. "Or at least, impossible within any time span that will do the infante's army any good. Five years, at a minimum. Perhaps ten."

Rubens shook his head in dismay. *Five years!*

"But surely you can get other Acontians to help you? Wouldn't that speed up the process?"

"Perhaps if they were still in the Netherlands. But they have all left, including my young and adventurous son, Francis Mercury! Those that haven't gone directly to Grantville are working in Essen for the Essen Chemical Company, or teaching or taking classes at the new applied sciences university in Bochum that the Republic of Essen has established. If you want their help, you will have to provide them more incentives than Essen is offering, and that will be difficult."

Von Helmont shrugged. "From what my son writes me, the governor-general of Essen, Louis de Geer, has gone to considerable lengths to attract the best scientific minds of Europe, particularly those young people like the Acontians who haven't been weighted down by the Aristotelian nonsense that passes for science education at most universities across Europe."

"But surely the manuscript can help," said Scaglia. "It appears to be quite explicit with regards to the ingredients and apparati needed to make this chloramphenicol."

Von Helmont shrugged again. "Oh, indeed it helps, gentlemen. But the devil is in the details, to use one of the Americans' proverbs."

Von Helmont brought out the manuscript to make chloramphenicol that Rubens had given him. "For example, take the ring nitration phase of this process. Not only do I need very pure sulfuric and nitric acid, which are themselves quite difficult to obtain, but I must also find some way to keep the temperature as close to zero degrees Celsius as possible at all times." Von Helmont shook his head. "Where will the instruments come from? True, Santorio Santorio developed an air thermometer in 1612, but it was notoriously unreliable. I have a precision mercury thermometer on order from the Essen Instrument Company thanks to my son, but they have a six month backlog in all of their orders, and their priority customers in Essen have first call on any emergency equipment. If you truly want to make chloramphenicol any time in the next few years, you will have to get the cooperation of either Essen or Grantville, both in terms of ingredients and instrumentation."

Rubens sighed.

Essen.

In any reasonably normal European political environment, the Republic of Essen would have

been still-born or quickly repressed by the Habsburgs. But with the League of Ostend focusing their military and diplomatic efforts on the United Provinces and the Swedish-supported United States of Europe, little outside backing could be given to Catholics along the Rhine who were alarmed at the founding of the new republic.

Still, Louis de Geer was a famous Dutch industrialist known for his pragmatism.

"So Alessandro, what do you think? Perhaps it is time we paid a visit to Essen? At the very least we can perhaps establish some useful diplomatic contacts."

Scaglia nodded and smiled. "And other contacts as well. I am interested in meeting more of these Acontians."

* * *

"God, I am so nervous."

Nicki Jo Prickett twirled when her friend, lover and confidante, Catherine Boyle, motioned for her to turn around.

Catherine eyed Nicki critically and then readjusted the silver barrette that kept Nicki's bun of black hair in place.

"Why?" said Catherine. "You've been to business and diplomatic meetings like this before. What's the expression? Piece of cake."

Nicki Jo shook her head. "Piece of cake? I don't think so. Colette and Josh are both in Grantville. All the other times I've been able to sit back and let Colette handle most of the explaining and negotiating. I was just along to provide the technical expertise and show myself off as the resident, token American. It's like I'm some kind of damn talisman. They want to keep touching me to see if I'm real."

Well, I can understand that," Catherine said softly, moving her hand down to stroke Nicki Jo's neck. "I like touching you, myself."

Nicki Jo laughed. "Now stop that! I've got no time for hanky panky!"

Catherine laughed herself and stepped back. Nicki Jo was a year or two older than Catherine, but she had been totally out of her element in the aristocratic society of seventeenth-century Europe. As the daughter of the great earl of Corke, Richard Boyle, on the other hand, Catherine had been learning the ins, outs and intrigues of European nobility almost from birth. When Nicki Jo had been recruited in Grantville by Colette and Josh Modi to help develop and run the Essen Chemical Company, they had hired Catherine Boyle to assist her, along with other members of the Acontian Society who had arrived from England in mid-1632.

Catherine motioned for Nicki Jo to turn again. Clothing for businesswomen in Essen was still more conservative than in Grantville but definitely trending in the right direction, in Catherine's opinion. Nicki Jo was dressed in a dark gray stylish riding skirt with inside pockets and a white, long-sleeved, high-collared blouse. Over the blouse she had a buttoned black vest.

She needed something more. This would be a male-only meeting, after all, except for Nicki.

Catherine snapped her fingers.

"What?" said Nicki Jo.

"You need something to add to your femininity," said Catherine, rustling through the dresser in their bedroom. "It never hurts to distract the male opposition in a business meeting. Ah, found it!"

"You want me to wear that?" said Nicki Jo, pouting. "I gave you that for Christmas."

"I know," said Catherine, holding up a pretty black lace choker. "But business is business," she said firmly.

* * *

Fortunately Nicki Jo's nervousness vanished within the first five minutes of the meeting. It helped that the governor-general, Louis de Geer, was effectively chairing the meeting. Colette Modi was De Geer's niece, and frequently invited Nicki Jo and Catherine to go along to the De Geer household for holiday visits. It was often a fun madhouse, since Louis de Geer had ten children under the age of eighteen.

The other two men at the meeting had been introduced as Alessandro Scaglia and Pieter Paul Rubens, diplomats from the Spanish Netherlands. Nicki Jo's eyes had widened a bit upon being introduced to the famous painter, but she had put a firm throttle on her desire to gush.

Her nervousness totally vanished when she heard what the diplomats were doing in Essen.

"Chloramphenicol? You want to make *chloramphenicol*? Why in God's name would you want to waste your resources trying to do that?"

Louis de Geer started to chuckle but quickly turned it into a cough. "Excuse me, Miss Prickett. Please continue."

Rubens waved his hand. "We have dozens, scores of soldiers dying every day from typhus, Miss Prickett. Surely we should do what we can to save their lives."

Nicki Jo suppressed a sarcastic remark. How typical. Keep the soldiers alive but screw the damn women, children and other civilians.

"I'd like to help you gentlemen, really I would, but the Essen Chemical Company won't be ready to produce chloramphenicol for at least another six months." She took a deep breath. "And when we do, I have to say that it is highly unlikely that we would sell you any for saving soldiers dying of typhus. Are you aware of what's coming to the lower Rhine Valley in 1635 and 1636?"

Scaglia and Rubens both shook their heads.

"Plague, gentlemen, bubonic plague. An epidemic bad enough that we found a few references to it in our books in Grantville, although the details were very sketchy. Even in Amsterdam, if the history holds true, the epidemic will kill twenty percent of the population. In the Rhine valley itself, it'll likely be much worse. In the history we came from, many of the towns saw sixty to seventy percent of their population die. So all of our chloramphenicol is going to go towards keeping plague victims alive over the next couple of years. But chloramphenicol is the cure, anyway. What about prevention?"

Rubens looked at her with a puzzled expression. "Prevention?"

Nicki Jo nodded. "A man named Benjamin Franklin in my country up-time had a wise saying that is very apropos here: 'an ounce of prevention is worth a pound of cure.' You would do much better to prevent typhus, rather than trying to cure it after it strikes."

She frowned. "And something else comes to mind, for that matter. How do you know it's really typhus, in the first place? As I recall from lectures I went to in Grantville before I moved to Essen, typhus and typhoid were not distinguished by doctors prior to the mid-nineteenth century. So maybe some of your typhus cases are actually from typhoid, which has a different disease vector entirely. And then there are diarrheal diseases. Similar vector to typhoid. If you really want to lower the death rates for everyone, not just the army, you need to work on prevention."

Nicki Jo smiled at De Geer. "Like we are doing here in the Republic. Isn't that so, Governor-General?"

Louis de Geer smiled back. "Correct, Miss Prickett."

"What you need, gentlemen," Nicki Jo continued, "is a complete arsenal of products to fight disease, particularly bacterial diseases that are easily transmitted by insects. Typhus is a bacterial disease that is transmitted by lice, so you need an insecticide that can be effective at killing lice. You also would like that insecticide to kill fleas, since fleas carry the plague. In addition you want a rodent killer, since rats carry the fleas that carry the plague. Then you also want a disinfectant, an antiseptic, and some antibiotics. Here in Essen we are producing a disinfectant that is also a bleaching powder, calcium hypochlorite. Calcium hypochlorite can be used to purify water, which, in combination with a good filtration system, can cut typhoid and diarrheal diseases practically to zero. Our insecticide of choice is hexachlorobenzene, which is easier for us to produce than the DDT that Grantville is making. Most of our benzene feedstock right now, however, is going to produce aniline dyes. As an antiseptic a good choice is a pure, high-proof alcohol. In addition, to prepare for the more difficult process of making chloramphenicol, our chemists are producing small quantities of an antibiotic called sulfanilamide, which can be used to prevent wound infections.

"Something to keep in mind, however, is that the Essen Chemical Company is a business. We can't give this stuff away or we'll go bankrupt. Research costs and the capital costs of building production facilities alone have run into the hundreds of thousands of guilders. We could indeed sell you, right now, hexachlorobenzene, as well as plenty of bleaching powder that could be used to prevent typhoid and other water-borne diseases. The only difficulty is, our number one priority customer has pre-bought all our production for the next year. So you'll have to talk to them if you want to purchase any."

"Your number one customer?" asked Rubens.

"Yup," said Nicki, "the Republic of Essen." She waved her hand towards Louis de Geer.

De Geer rubbed his hands. "Shall we begin negotiations, gentlemen? I am sure we can reach some accommodation beneficial for all."

* * *

The cardinal-infante was silent for a long time after Rubens had finished communicating the terms of the agreement that the Republic of Essen had offered.

"Well," said the infante, "the terms do not seem too bad. They will sell us the insecticide, the bleaching powder and the water filtration units for the cost of production plus ten percent. But why do I get the impression that there is more that you are not saying, Pieter?"

Rubens nodded. "You are correct, Your Highness**.** There is indeed more. De Geer will sell us what we need, but only if we allow the Republic of Essen the chance to transport an equal amount of each product into Amsterdam."

"Is that all?" asked the infante.

"As far as the health products are concerned, Your Highness, but De Geer had more to propose."

The infante motioned him to continue.

"De Geer said that he was willing to accept up to ten thousand Counter-Remonstrant exiles in Essen, provided you acquiesce to the annexation by the Republic of County Kleve and County Moers. In addition, he proposes a secret twelve-year truce, effective upon the termination of the siege of Amsterdam, between the Republic of Essen and the country or political entity you represent at that time."

"Interesting," said the cardinal-infante quietly. "Anything else?"

Rubens nodded. "He also proposed that the Netherlands—however that term winds up being defined—negotiate what he calls a 'NEFTA' with the Republic of Essen. To promote trade and commerce."

"A 'NEFTA'?"

Rubens smiled. "It's one of those acronyms that the Americans are so besotted with. It stands for 'Northern European Free Trade Association.' De Geer, being a businessman, feels that the Republic's natural partners, other than the new United States of Europe, are the United Provinces and the Spanish Netherlands. Particularly the latter, actually, at least in the immediate period, given the current transportation networks and commercial markets. He was also quite explicit about his fears of French hegemony. He has read some of the same histories we have, Your Highness. With regards to the French, he said, a few ounces of prevention may indeed be worth many pounds of cure."

So, thought the cardinal-infante. De Geer knows, or guesses, what I have planned. And is willing to help.

Rubens knew as well, although the cardinal-infante had never said anything explicitly to him on the subject. But the man was almost as good a diplomat as he was a painter, and the Spanish prince was quite sure he had deduced the situation. And, over the past months, Rubens had made clear enough for his part that he'd transferred his allegiance from the Catholic powers of Europe in general to the rising new Catholic power in the Low Countries.

"So. Pieter, are you ready for another trip to Essen? I think Governor-General De Geer will be expecting an answer, don't you?"

Rubens nodded.

Burmashave

By Chris Racciato

May, 1633

Ernst Frohlich looked at the man sitting across the table from him. He was nondescript, clean shaven, and dressed in contemporary clothing, but his accented German identified him as one of the now famous "up-timers" from Grantville. The fact that the man had requested to meet him anonymously in a public house in Meiningen late at night in the middle of winter both puzzled and intrigued Frolich. Meiningen was quite some distance from Grantville, and separated from it by the entire Thuringenwald, to boot.

Still, the offer in the letter of a guilder and free meal for an hour of his time insured that he was there in the pub that evening. As a locksmith, he was used to traveling at the whims of customers to install locks in houses, estates and stores after they had closed for the day. He was no stranger to working by lamp light far into the night.

"So, may I ask what this meeting is about?"

The man looked around the room to insure that they were alone. It was late on a Tuesday night, and most of the other patrons had either left or were too drunk to pay much attention to the two men.

"Let me start by saying that I was told that you are a man of discretion, and I was assured that you could be counted on to keep any matters we discuss tonight strictly confidential. That is all that you need to do to earn the guilder I promised. For my part I can tell you that nothing that we will be discussing is in any way illegal. Do you agree to those terms?"

Ernst hesitated only for a moment and then nodded. The up-timer placed a heavy silver coin on the table and slid it over to him.

"Very well. I need an honest opinion from you." He reached into a pouch on his belt and withdrew a small metal object. He placed it next to the guilder on the table. "Can you make something like this?"

Ernst picked up the object and turned it over in his hands. He brought it closer to the candle on the table to look at the details. The metal work was exquisite. Not extremely ornate, but all of

the parts fit together tightly. The clamp at one end was spring loaded, and there was a small amount of filigree work. All of the surfaces were polished to a silver gleam. There were a few places where this silver layer had worn through, and yellow brass was showing. Whatever it was, it had obviously come from whatever future world these people had come from. He sighed and handed it back reluctantly.

"No. I cannot. I have no idea how to coat the brass with the other metal. I am sorry."

The other man frowned. Then he pushed the thing back towards Ernst. "I am not worried about the plating. I am interested to know if you could do the rest of it."

"Yes. It is fairly straightforward. It is only made of a few pieces. If you just want one made out of brass, I could do it in a few days."

"Good. That is what I wanted to know. My next question is would you like to learn how to plate the brass like that?"

"Of course!" he said instantly. Over the past two years, the rumors of what these "Americans" could do had virtually flown across Thuringia and Franconia. Their metal work was renowned. To learn some of their techniques would give Ernst's shop a decided advantage over several of his competitors, if only in novelty value. "But now I have a few questions for you. Who are you, and what exactly is that thing"

The man leaned back and smiled. "You can call me Mr. Smith for right now. And that 'thing' is half of a small fortune if everything works out right."

"If it is worth a fortune, then why are we meeting secretly in a pub? Your people are supposed to be such wizards with making things. Why aren't they making these?" He eyed Mr. Smith suspiciously. "And most importantly, why me? And why do you want someone in Meiningen? I would think somewhere closer to

Grantville . . ."

The up-timer shook his head. "As I said, I was told that you are a man of discretion. One of your former clients assured me that you were both skilled, and exceedingly honest. I needed someone that I could trust with this project. The reasons I don't want to do it in Grantville—or anywhere nearby—are simple. First, everybody there has other projects that are considered more important. Second, nobody else so far as I know has thought of it yet. And third—this explains why I came to Meiningen—I don't *want* anyone in Grantville knowing what I'm doing. Not till I'm ready to start selling the product."

He leaned forward again. "If you look here"—he pointed to some stamped numbers underneath the clamp, barely visible in the flickering light—"it says 1912. That is when this was patented in the United States. That was almost ninety years before the Ring of Fire hit us. And the original models go back maybe twenty years before that. By the time we got here, this was old technology. Almost nobody used it anymore."

Ernst thought about that while he sipped his ale. He put the tankard down. "So I make you one of these things, and you can show me how to coat the metal? How is that worth a fortune?"

"No. You make several hundred of these things, I pay you for them and I show you how to plate them. Plating is the process. We can use gold instead of nickel to plate them. It is easier for me to get my hands on, and it will last longer."

"I still don't see how this is a fortune. I would be more than happy to make these for you, though to do hundreds would take some time, and you would have to pay some of the costs up front. I can't afford to have my shop only making these for you, and neglecting our other

customers." He paused and looked back at the metal tool. "And you never answered my question. What is it?"

"It is called a 'safety razor.' It allows you to shave without having that six inch blade waving around your throat."

Mr. Smith picked up the razor and inserted a small, square blade into the clamp. He then held out his forearm and proceeded to shave the hair off a patch of it with remarkable ease.

"The reason I picked your shop to do this is because you have the ability to make these, I don't. I am not a metal worker. You are small enough that you should be able to keep this a secret until we are ready to hit the market."

"We?" Ernst asked, startled.

"Yes, we. In addition to payment for the handles, and the information on plating, I am prepared to offer you a quarter of the ownership of the business. Another quarter of the business is owned by the sword maker who is currently making the blades for these."

Ernst thought about that while he finished the ale. A quarter of a business for staying quiet. And he would be paid for the razor handles. It was an intriguing proposition.

"So why all of the secrecy?"

"It is simple. As you can see, this is not a complicated device. Any competent smith could make one. The key to this market is name recognition. You want people to always think of your name when they think of a product. In our century, advertising was a fine art. It was done on a scale that has never been attempted here and now. People spent lifetimes coming up with ways to get the customers to remember the company names. To draw them into buying something that they didn't really need, but felt that they could not live without. Safety razors took the market by storm when they came out. One of the first men to sell them sold less than a hundred of them the first year. And maybe a few hundred blades. Within a few years, he was selling hundreds of *thousands* of razors, and a proportionate number of blades. He had found a need in the marketplace, found a product, and made sure that his was the name people thought of when they went to buy a razor. There were literally hundreds of other companies that sprang up within a matter of years that copied his idea and tried to take the market away from him. That razor there was made by one of his competitors. But his company had the advantage of name recognition. And better marketing plans. A hundred years later Gillette, the man's company, was still around. Almost none of his competitors were."

He paused and looked around the mostly deserted inn. "The razors have to look good, and must be designed to last. That one there is at least eighty years old."

Ernst picked up the safety razor from the table and again examined it critically. He carefully removed the blade. It was rectangular, made of blued steel. Incredibly thin, it was sharpened on one side. He drew it across his thumb, and gasped as it drew a tiny drop of blood. He stared at the up-timer. "You expect me to believe that this is over eighty years old? Impossible!"

Mr. Smith smiled "The *blade* is new. It is a copy of the original blades, made by the man who already owns a quarter of the business. But the handle is over eighty years old. I have been using it myself for several years now. And it belonged to my grandfather before that. He bought it used as a young man, and used it for several years before moving on to a better, more modern design. As you can see, there is only a little wear for how much it has been used. But the blades only last about a week. There is where we make the money. People will have to come to us to get replacement blades. We can make them cheaper than their local blacksmith, because we will have

a shop that is doing nothing but turning out these blades as fast as they can. Again, I am not a metal worker. But I do have some knowledge on how some of the original up-time things were made, and I have spent the last year doing research and experimenting. We can gold plate the handles and make them last for many years. As long as they last, the customers will keep coming back for blades. It is just the way people are. They won't want to spend the money to buy a different razor if the one they have still works."

"I will want something legal in writing. If this is as big as you say it will be, I want something that spells out exactly what you have proposed."

Mr. Smith grinned. "So does that mean we have a deal?"

"Yes. We do."

* * *

Over the next few weeks, Ernst produced several prototypes for Mr. Smith, whom he now knew was named Zeke Pridmore. They decided on the final design, and production began. Zeke supplied several things to help with production. The rollers to flatten the brass stock to a specific thickness. A press to stamp out and form the sheets of brass to exact shapes. And most interesting of all, a small glass vat, a "car battery," and a pedal-powered charger to keep it working. The electroplating was incredibly simple once it was demonstrated, and though gold was expensive, a single ounce was enough to cover many pieces of brass. Within a few months, Ernst and his two apprentices had made almost a thousand safety razor handles.

When Zeke came to collect the handles, he showed them the final packaging. It included the handle, five blades, each individually wrapped in a colorful waxed paper envelope, a small lather brush, a small glazed earthenware cup and a round cake of pleasant-smelling soap. All of this was nestled in a small wooden box with the company name and logo burned into it. This was to be the initial marketing run. The profits on these sets would be negligible. And less elaborate sets would be available in the next run. But as Zeke had explained, it was important to make the initial "splash" in the market. And the primary market would start in the area immediately around Grantville, where people were already familiar with the idea of safety razors.

By the end of October, Ernst had given up all of his other work. He now employed two journeymen, another apprentice, and was having another room added on to his shop just to handle the extra press and rollers that he had purchased. New batches of razors were sent off as soon as they were completed. In his almost weekly correspondence with Zeke, he received newspaper clippings of advertisements for both the razors and the accompanying supplies. Evidently the advertising campaign was working. Sales were extraordinarily good. A soap factory had been purchased to keep them supplied with the various toiletries that the company was now producing. And a bank draft for his share of the profits arrived monthly.

In November, he received a letter asking him to come and visit the company headquarters in Grantville. After months of working with one of the people from the future, the idea of actually seeing the town was too much to resist. It would take him almost a week to get there, but winter hadn't set in yet and he could now afford the time off. Leaving the shop in the capable hands of his new foreman, he set off for his first trip outside of Franconia in his life.

The first few days of his trip were uneventful. As he got closer to Grantville, he started to see what Zeke had described as "billboards" for their razors. The closer he got to Grantville, the more of them he saw. Outside of Suhl, he saw a small sign by the roadside. It caught his attention because it was in the same colors as the company billboards he had seen in the towns. It was in both German and English, and simply stated: *If you don't know*.

He stopped the wagon, and got down to look at it. It was definitely the same red and yellow color scheme that they were using, but there was no logo, no name, and only that one cryptic line.

"I will have to tell Herr Pridmore that something has happened to one of his precious signs," he murmured to himself.

* * *

A few minutes later, he came upon another sign. This one was identical in size and shape to the last one, and it had only the words: *Whose signs these are.*

Again, Ernst stopped to look for any logos or markings, and found none. He climbed back up and started the wagon forward again. He was puzzled. Zeke had made such a big deal about advertising to draw in customers, and here were signs that looked like theirs, yet made no sense.

A third sign was posted still farther down the road. It was just like the previous two signs, and it stated in neat lettering: *Then you must not*.

He didn't even bother stopping to examine it. But he was actively looking to see if he could spot the next sign as he went on. He was rewarded a few minutes later as he came around a bend in the road to find a fourth sign.

Have traveled very far . . .

As Ernst went around the next hill, he saw a full sized billboard in the same red and yellow as the signs. Across the top was the unmistakable company logo in bright red.

Burmashave.

Ernst smiled to himself and rode on. Drawn in, indeed.

Schwarza Falls

By Douglas W. Jones

1

To: Grantville Emergency Committee.
From: John Sterling, Edgar Frost and Francis Kidwell.
Date: May 30, 1631? fifth day after the disaster.
Re: Road options around Schwarza Falls.

Yesterday, May twenty-ninth, the fourth day after the disaster, we went up Buffalo Creek to the power plant to look into how to build a road connection over the border into the lands to what is now the southwest. You asked us to tell you everything, even if we weren't certain it was important, so pardon us if we ramble a bit.

I. The Situation

The report from the power plant is correct. There's a real castle up there looking down on us. Don't imagine a fairy-tale castle. This is a deadly serious looking fortress. There's also a bit of a village there, or at least half of one. The village and the castle are both named Schwarzburg. We need to make friends with whoever runs the place, because they're guarding our southwest flank very nicely. And, if their cannon are even mediocre, I doubt there's much we could do to stop them from wiping out the power plant.

As you come around the bend in Buffalo Creek, about a mile out from Grantville, what you see is a wall of black rock, streaked with red, green and brown. This castle sits on a hill dead center on top of it, right above the power plant. The cliff has a mirror polish on it that reflects the sky when you get close enough. We guess that from the bottom of the Buffalo Creek valley up to the floor of the valley above, it must be three hundred feet. Our ridge tops are about four hundred feet above the valley floor, but the hills of the land we've been plunked into are much higher. We guess about twice as high, which means eight hundred feet up from the valley floor. The German

hills aren't as chopped up as ours. They seem a bit rounder, but the valley walls are steep enough.

There's a stream in the valley we cut into. They call it the Schwarza, and where it flows over the cut edge, there's quite a waterfall. We'll call it Schwarza Falls. It's hard to guess how high it is, because it's pounding down on what was a steep slope and washing quite a bit of that slope downhill. We figure it's a clear fall of at least fifteen feet, but then it tumbles down at least two hundred feet before it flows into what used to be Spring Branch.

If it hadn't been for the fact that the Schwarza valley is offset a bit from Buffalo Creek valley, there'd be no hope of getting a road up that cliff. As things stand, though, the Schwarza had a loop to the northeast that got lopped off by the disaster. (We're starting to call it the "Ring of Fire," by the way, since that seems a pretty good description of the disaster—"RoF" for short.) The ridge to the north of Buffalo Creek just manages to come up to that part of the Schwarza's stream bed. Also, just southwest of Schwarza Falls, there's a little knob on our side that just goes up to the level of the rooftops of some houses nearby. It's all that's left of the ridge that divided Spring Branch from Buffalo Creek.

One thing is real clear. That little village at the top of the falls is in big trouble. Half the place is gone. Calling it a village may be too generous; it was a cluster of houses and barns built beside a bridge across the Schwarza. In a few places, the ground collapsed as far back as thirty feet from the edge, taking houses and barns if they happened to be there. There's quite a mound of muck and rubble along the face of the cliff below those places. There's one barn, though, that's standing right on the edge and hasn't moved an inch.

The cut-off chunk of the Schwarza northeast of the castle must have dumped its entire contents and a good part of its riverbed over the cliff in one great gush. There's a flow of debris from there down along what used to be Spring Branch Creek. It looks like what was left of Spring Branch Road inside the ring of fire was pretty well buried or washed out within a few minutes on Sunday. The culvert over Spring Branch Creek on the main road looks like it survived that first gush, but it was never intended to take the flow of the Schwarza river, so the road is acting like a dam. The water was over the road when we got there. It's a few inches deep and running fast, but the road is pretty flat so the overflow is spread over quite a distance. It's eating at the road, and we think it'll wash it out unless we dig up the culvert and put in a proper bridge.

We waded across and took a hike up what's left of the ridge that divided Buffalo Creek from Spring Branch. It's the steep but direct route into what's left of the lower Schwarzburg village. They were watching us the whole time, and there's no doubt that they were as nervous about us as we were about them. By the time we got up the hill, a guy named Franz was there to meet us, with two others who stayed back a bit and whose names we didn't get. Franz seemed to be an officer in the guard of the castle. As near as we could make out, his boss is the graf of Schwarzburg and a town named Rudolstadt.

Franz turned out to be a decent fellow and pretty quick witted, but he had some big pistols in his belt and a sword. We were careful not to put our hands anywhere near our holsters those first few minutes. We'd better send someone official to Schwarzburg quickly, someone who knows German!

We read Franz the message you wrote for us in German about wanting to open the road connections across the border of the "ring." After we gave him the letters you gave us, we tried to have a conversation. I wish we knew more German, but the stuff you gave us helped a lot. With lots of mistakes, hand gestures and an occasional picture on a notepad, we managed to get by.

He told us that the Ring of Fire destroyed the road from Schwarzburg to Rudolstadt where, as

near as we could make out, his boss lives most of the time. It also destroyed the road to the town of Saalfeld. As a result, it seems that we're in agreement about trying to open up a road connection.

The bridge across the Schwarza at Schwarzburg is right at the lip of the falls. It's in serious danger of collapse because of all the dirt that's been washed away from the foundations. If the bridge goes, the farmhouses that are left on the southeast side of the Schwarza will be cut off, so they're already working on a temporary wooden bridge upstream from the old one. Timber is one thing they have plenty of. The roads here are mostly grass and packed dirt, with cobblestones only where erosion is likely to be a problem.

Northeast from the falls about two hundred yards, the road is almost cut off with half of it slumped away. It looks like it was right on the riverbank there, at the southeast end of the loop of river that the Ring of Fire sliced off. Beyond that, to the northwest, the road is in good shape, with stone retaining walls in places as it takes a long switchback up the slope to the castle gate.

We didn't go into the castle, but we did go up to the square by the gate where there's a bit of an upper village. The castle sits along the crest of a knife-edge ridge with the Schwarza river wrapped around the west, south and east sides. You couldn't ask for a better defensive position, but it's not all that big. The castle must be a quarter mile long but the ridge isn't very wide anywhere.

II. Road Proposals

Franz, the officer, must have been thinking about the problem of getting a road down from Schwarzburg, because he took us to the jumping off point where a new road could connect. He pointed out the route he thought would work before we left to walk down that way. We agree with him, so we'll describe that route and forget the others.

Be aware, we're not engineers, just three guys who've had plenty of experience building and maintaining roads. We're confident that we can do this job, and do it well, but under the laws of West Virginia, we aren't really qualified. It would be nice if there was a civil engineer to help with this project.

The road would turn north just east of the old Spring Branch road and traverse up the east side of the Spring Branch valley. This would almost follow the power company right of way once the power line gets on the same side of the creek. Then, the road would turn broadly around the head of the valley to meet the northwest end of the abandoned riverbed of the Schwarza. The climb up out of the riverbed would be short, and we'd meet the road up from the lower village about a quarter mile northwest of the waterfall.

We figure this would be about four thousand feet of road climbing three hundred feet, so the grade should be under eight percent. On the walk down, we flagged the path we followed while using a pocket clinometer to try to keep our path at seven percent. That brought us out a bit on the high side, but those flags should make charting the path back up pretty straightforward.

We figure that a crew with a medium dozer and a couple of chainsaws could carve a temporary one-lane road up to Schwarzburg along the Spring Branch route in about a day. That's about two hours at half a mile an hour for the first pass of the dozer to cut the roadbed, or about two hours, and then three more passes to shape the crown at a mile an hour, make that three hours. That's five hours of an eight hour day, but it's fair to budget the whole day to allow for the unexpected. There's some decent timber along the way we ought to try to salvage while we're at

it.

There's so little watershed above our proposed route that a temporary road like that could last a few years, we think. But with another day of work to put in about five culverts, we could make a road there that would last. We think at least two of the old culverts along Spring Branch Road can be recovered with a winch and some digging, so someone should inventory culverts we can salvage from elsewhere.

With three days work and several truckloads of crushed rock, we could make the new road meet county standards for unimproved roads, which is something none of the roads we saw up on top manage to do. Two days of this would be to widen the road to two lanes, and one day would be to put down the rock and grade it nicely. If we put in the culverts soon enough, the road widening can wait until the traffic demands it.

We noticed that the power plant has a Caterpillar D6. They use it for pushing coal around. We asked about it at the front gate, and the guard there phoned the plant manager, Bill Porter. The upshot is, the power plant is willing to loan the dozer to the county for a day's work. They think that anything we can do to get the folks in that castle on our side would definitely be a good idea.

III. Defense

Finally, you asked us to say something about defending our new borders. If the folks who run Schwarza castle fail to block invaders, or if they decide to attack us, we could defend this end of the valley from the ridge northeast of Spring Branch. That would let us look down on our new road from about two hundred yards and we'd look across at the steeper slope down from the lower village from a distance of about four hundred yards. The castle would have an altitude advantage on us, but the ridge would offer cover and we could dig bunkers into the ridge top. You might want to put a jeep trail up to there from the valley behind the ridge.

The other defensive position would be on the ridge top across Buffalo Creek southeast of the power plant. This would look straight down our new road from a range of six to twelve hundred yards. Again, a bunker would be handy, but the castle hasn't got a good shot at this position because the chopped off hillside southeast of the castle is in the way. The big threat here is from snipers sitting right on the edge of that hillside, but the ground slopes down steeply to that cliff edge, enough so they wouldn't be able to hide behind the terrain. It looks steep enough that they'd have to worry about sliding right over the edge if they slipped.

John Sterling has the most military experience of any of us. He says he'd put mostly snipers on the ridge above Spring Branch, along with a few mortars or RPG launchers, and he'd put the light artillery on the south. Do we have any weapons heavier than hunting rifles? All in all, we agree that we'd much rather defend Grantville from Schwarzburg Castle. Seen from Schwarzburg, it looks like the cliffs do a good job of blocking all access to Grantville for over a mile in either direction, perhaps more. The castle is the strong point that covers both paths into the valley.

IV. Other

Franz told us that there were people in some of those houses that went over the edge. We had trouble communicating about this, but I get the feeling there might be ten bodies somewhere at the bottom of the cliff. We said that he was welcome to send people down to try to find the

bodies, and we said that we would try to get people to help.

2

To be delivered to Ludwig Guenther, Graf of Schwarzburg Rudolstadt, or in his absence, to the head of the guard at Rudolstadt:

Your humble servant, Franz Saalfelder, officer of the guard at Schloss Schwarzburg, begs to report again on the strange events of these last few days.

I do not know that you received my first report of the events of Sunday, the fifteenth day of May, but the scout sent from Rudolstadt on that day arrived here on Tuesday, having worked his way to Schwarzburg along a very difficult route. God willing, he will have completed his circuit and returned to Rudolstadt by now with even more to report.

Sunday, the fifteenth day of May, at around noon, the very earth seemed to shake with the roar of thunder. The guards on the east-facing battlements were blinded for a moment by a wall of light that seemed brighter than the sun but as brief as a lightning flash. Fortunately, your humble servant was not looking that way at the moment, but the roar was horrible even indoors.

What devilment it was I cannot say. At first, I was sure that the very pits of Hell had opened, for all of the land to the north and east of Schwarzburg had disappeared. Where the valley of the Schwarza and the road to Rudolstadt had been, there was nothing but a pit, hundreds of feet deep, with a strange country on the bottom. Half of the houses and barns beside the Schwarza were gone in an instant, and some of the flat land beside the river fell over the edge shortly after, taking another house and two barns.

We cannot say for certain how many people were lost when the pit opened, but it cannot have been less than ten. It is fortunate that it was a Sunday and many had yet to leave the castle where they had attended chapel services that morning. Those who hurried home to fix their Sunday dinners were the victims, while the lazy who stayed to talk were saved. Fortunately, most of the refugees fleeing the mercenaries who have lately been a plague on the Saale valley have been moving on up the Schwarza into the well protected villages beyond Schwarzburg. Some of the survivors from the lower village want to go down into the pit to look for bodies so that they can have a proper burial. We can see wreckage of some of the houses that slid over the edge of the pit just after the pit opened. There may be bodies among the wreckage.

The scout you sent followed the north and west rim of the pit on his travels from Rudolstadt to Schwarzburg. He tells me that it is not entirely a pit because in some places the mountains of the strange new land within overtop our valleys. Of more import, the pit appears to be a near perfect circle, several miles in size, reaching from the edge of the valley of the Saale all the way to Schwarzburg. God willing, you will have heard his report by the time I write this.

Our chaplain cannot say whether this strange occurrence is the work of the Devil or not. His advice appears as sound as it is trite, to hope for the best while preparing for the worst. We have posted guards to report on what is within. Day and night, I have been called to the battlements or to the very edge of the pit to witness the strangest of events.

The land within the pit is occupied. There are houses of strange construction there. The strangest is a great brick building not far from the edge below Schwarzburg. At first, I thought the

building was a fortress, for it is great enough to be one. Now, I believe it to be some kind of mill or forge, for they have a great pile of what looks like charcoal outside the building, and there are great smokestacks, although there is now no great amount of smoke. Immediately after the blast and blinding flash that created the pit, this fortress or mill was emitting a loud roar of noise that went on and on, loud enough to block out all else, and horrible. Great clouds of white smoke or steam rose from the mill and ceased when the noise ceased. Since then, it has been quiet, except for an occasional puff of steam and an occasional strange noise.

There are roads within the pit that look finer than any road I have ever seen. They are wide enough everywhere for two wagons to pass, smooth and well drained, with broad ditches to each side to carry away the rainwater. What is most terrifying is that they have wagons that appear to move as if by magic, sometimes faster than a horse can gallop and with nothing to pull them along. Watching from the castle and from the edge of the pit, we can see that the people within are not pleased. To them, they are within a great stone wall with few escapes, and we have seen groups of them looking up and pointing in our direction from the great mill. Their roads once went beyond the walls of the pit, perhaps. There are lines of strange towers leading away from the great mill to the north and south that support ropes made of wire. Where the Schwarza pours over the wall into the pit, it has created a new river that is flowing over one of their roads and will soon destroy it. The same new river also threatens to topple one of the strange towers.

There are two places near Schwarzburg where the hills within the pit come up to the level of the ground outside. One is just south of the bridge across the Schwarza below the castle, and one is to the northwest where the road used to turn east along the north bank of the Schwarza. We sent scouts into the pit that way with orders to stay hidden and to leave no sign of their passage. They report that there is a town several miles into the land where two valleys meet and that there are also smaller villages. There are even churches, or at least buildings that look like churches, with steeples surmounted by the symbol of the cross. This gives our chaplain some comfort.

The scouts reported many strange things. They have found twisted wire fences that must be many miles long, with sharp barbs of cut wire twisted onto the fence wire. The quality of the wire was very good, but in many places, they report that it was rusted, as if nobody ever took the time to care for it. All of the houses they spied out were very strange, constructed more of sawn wood or brick than of stone and plaster, and well painted. At night, many of the houses are lit up like daylight, with lights brighter than hundreds of candles. Even barns that are old and run-down have too many windows glazed with large panes of the most perfect glass anyone has ever seen. The towns, and even some houses outside the towns, have hellishly bright lanterns mounted on poles overhead so that people can move about at night just as freely as they do in the daylight.

Today, Thursday the nineteenth of May, three men from within the pit came up the hill. We met them at the bridge over the Schwarza, and I must report now what we learned in talking with them, or in trying to talk, for it was difficult.

These men were dressed most outlandishly. Even from the castle, even when they had not yet begun to climb, that much was evident. Each man wore a yellow helmet and an orange vest; the orange color was unnaturally bright. As they came closer, it was apparent that they wore blue pantaloons, cut very close and exceedingly well made but well worn and with the color faded. Under their orange vests, they wore well cut shirts, and each man wore a belt from which hung several things. All three men wore what must have been pistols, very small ones, but arms, nonetheless.

After we tried to talk, one of the men let me try on his helmet. It was very light compared to

what I expected, not metal, but something much lighter and yet harder than leather. The helmet did not rest on the head, but was supported away from the head on a clever network of straps. I feel that a blow to the helmet would not be felt directly, not with those straps in place.

They also saw that I was curious about the implements on their belts. One of them showed me a most remarkable knife. It was small enough to fit into the palm of my hand, but it could be unfolded to reveal a knife blade, a file, a pair of pincers, and several other kinds of picks and implements, perhaps ten in all. Not only the blades, but the handle itself had the look of the finest silver, and yet it was as hard as the finest steel.

They speak English, it seems, and a little French, very little. Unfortunately, we have no English speakers in our garrison. They came prepared knowing that we spoke German, with a message written in German that they read to us and with a remarkable letter that they gave to us, which we include with this message. There are many things we would have spoken of if we had been better able to communicate.

Their message confirmed that the town in the middle of the pit is called Grantville. My spies had reported signs within that said "Welcome to Grantville" on the roads outside the town, so this was not entirely new to me. I remain puzzled why an unprotected town would post signs saying welcome, if indeed that is what the signs say.

At first I thought the name Grantville sounded French, but their message explained that they are from a land called West Virginia in the United States of America, that they came from hundreds of years in the future, and that they have no idea how or why they are here. The message also confirmed my guess that their appearance in the pit has caused a crisis. They say they are governed by the Grantville Emergency Committee, clearly not a proper government and certainly not the government of this West Virginia or United States.

Their strange clothing and tools certainly suggest that they are not from our world, but their letter is dated Wednesday the twenty eighth of May, 1631. From this, I gather that they are using the Catholic calendar of Pope Gregory and that they have already communicated with someone on the outside of the pit.

The men's names were John Sterling, Edgar Frost and Francis Kidwell. They printed their names in Roman letters on a piece of paper that they gave to me and that I enclose with this message. Each of the men had a small book of blank sheets of paper cleverly bound with a spiral piece of wire, and each man had a pen of some strange kind that did not need an inkpot. They used them freely, drawing pictures when they did not know the words.

These men were well educated, able to read fluently even when they were reading German, a language they obviously spoke very poorly. I am being generous; they spoke almost no proper German but only some words. All three were also able to write quickly and well. This is why it took me a while to understand that they were not military men, nor were they ambassadors. Rather, they saw themselves as simple laborers, charged with but one job, that of finding the best way to build a road from the bottom of the pit up to the road at Schwarzburg. Of course, that is what their message said, but appearances can deceive and then deceive again.

I asked these men about the dead who had fallen into the pit, and this was a difficult question, both because of the language and because, I think, it was outside their authority. They said that we were welcome to send a burial party into the pit to recover the bodies, and they said that they would try to send help. I believe that they were sincerely troubled by the deaths.

Without being able to ask your leave, but knowing how important it would be to reestablish the road from Schwartzburg to Rudolstadt, we gave them permission to survey a route for

connecting our roads to theirs. They will certainly not be using any new road without our leave, because Schwarzburg castle is perfectly placed to guard any road they can build. Their message did say that the road would be open to us, and that we would be welcome to use it to travel through Grantville to reach places to the north and east.

We had already been discussing the problem of a road into the pit among the guards, since we are worried about how to get food supplies up to Schwarzburg. The farmland in the Schwarza valley cannot feed the normal population of the valley, and even though most of the refugees have brought several weeks of provisions, we will face problems if we cannot reopen the roads. Bringing food in over the hills from Hildburghausen could double the cost of cartage, and it would be even more expensive to pay for cartage around the pit from Rudolstadt.

I hope I have not abused your trust! I showed these men the path into the pit that we thought would work. In showing this, I was careful to walk ahead to assure that there were no footprints visible, since our spies had crossed into the pit very near the point where I took them.

I watched the men walk back down into the pit, and I was surprised to see that they took a longer path, swinging broadly around the little valley that comes up from the pit to meet our land. They seem intent on building a road much longer than the road I would have thought of, but at a far more gentle slope. One of them had a hand-held instrument of some kind that he would occasionally use to look backward or forward along the path they were marking, while another of them would occasionally tie a strip of orange ribbon to a tree or sapling to mark the path.

I humbly beg your forgiveness if I have erred in carrying out my duties in these trying times. I will send a horseman with this letter Friday morning, with instructions to travel quickly around the pit to the north, then east to the Schaalbach road into Rudolstadt. Your scout assures me that this route should be safe, although it comes close to the pit at Rottenbach and even closer in parts of the Schaalbach valley. Until we learn that passage through Grantville is truly safe, I believe this is the best route available.

Your humble and devoted servant, Franz Saalfelder.

3

To: Grantville Emergency Committee.
From: Mark O'Reilly.
Date: Saturday May 31, 1631.
Re: Visit to Schwarzburg.

At the town meeting, you asked everyone with military experience to notify the emergency committee, and you asked everyone who knew German to notify the committee. I put in my name for both, but I never imagined that Rebecca Abrabanel would come visiting on Friday afternoon to test my German and then send me out immediately on a job. I feel that I'm in way over my head, but I guess we all are.

Ms. Abrabanel showed me a memo that some guys from the road department had just written. She asked me to read it, and then she asked me what I thought we should do. I told her we ought to send someone who knows German, someone who this officer of the guard named Franz could

relate to as an equal, so that we can cut a deal with him. Then I understood it was me and I tried to back out.

Ms. Abrabanel explained that I was the best she could find on short notice. The job needed someone who spoke German, even bad German like mine. It had to be someone who had military training, and my Guard training would do. You don't send a general to make a field agreement with a captain, you send another captain, and you back him up with a couple of privates, and in this case, with a burial detail to help the Germans.

So this morning, I went up to the power plant with Pete McDougal and Ron Koch, who have mine safety experience, and Brick Bozarth and Miles Drahuta, who have UMWA training in mine rescue. We took the equipment McDougal and Koch recommended, and we ended up using most of it. We worked all day, and I'm tired. But Ms. Abrabanel said she wanted this report as soon as possible, so I'm trying to get it down on paper before I quit for the night. Thank God for computers. I wonder how long they'll last.

I. Rescue and Recovery

We found a small crew of Germans working through some wreckage at the bottom of the new Schwarza Falls. Conditions were very unsafe because the falls are cutting into the ground very quickly at the base. The Schwarzburg castle chaplain was there, Pastor Hermann Decker. I did my best to explain that we were there to help and asked what we could do.

There was one problem. These people don't usually speak the High German I learned in school. They have a regional dialect, so between that and my rusty German there were many places where we stumbled. It was a good thing I had my old English-German dictionary along, because there were lots of words that gave me trouble. Even Ron's native twentieth-century German wasn't much help.

They had already taken out four bodies. They were concentrating on the areas where wreckage showed among the rocks, sand and gravel that had come over the edge after the Ring of Fire.

The horrible thing was, if we'd known to rush out there last Sunday, right after the Ring of Fire, we'd have probably saved some lives. Some of what went over the edge fell hundreds of feet, but other stuff flowed down the slope after only a short drop. We didn't know, of course, but all of us would rather have saved people's lives than just dig up the dead.

McDougal and Koch insisted that the first thing we needed to do was to make the workplace safe, so they improvised a bridge across the foot of the falls using fallen trees and set up safety ropes. I was left to try to explain to the pastor that we were going to use a chainsaw to trim the fallen trees and that it might upset the Germans at first because it was both noisy and strange. Once the bridge was up, Ron went back to work on opening the mine, so we were without him for most of the day.

The Germans were very impressed with the chainsaw, but the simple come-along we used to winch the tree trunks together side by side was just as novel. The come-along and chainsaw helped quite a bit with digging through the building remains that had fallen over the cliff. Those houses were half-timbered, with mortise and tenon joining. Most of the joints snapped, but the timbers were very heavy and some parts of the framework that fell almost flat held together. Being able to quickly cut them apart and pull the pieces away was a real help. By noon, we recovered three more bodies. In the afternoon we recovered two more. If there are more bodies,

they are likely to be deeply buried.

Some of the Germans doing the digging obviously knew the victims, because when they found bodies, they knew their names. Some of them broke down pretty badly, and Pastor Decker had his work cut out comforting them.

II. Relations with the Castle

There were observers on the cliff top overhead all the time. We saw them when we arrived in the morning, and made a point of waving to them in a friendly way before we went to meet with their work party below. They watched us pull together the temporary bridge. In midmorning, just before eleven, a delegation came down, a dozen or so. Most of them were there to join in the work, but there was also an officer and two guards.

The officer's name is Franz Saalfelder, and he's the same guy our first crew met with last Thursday. I think his last name isn't really a family name, but that it really means he's from the town of Saalfeld, the town just to our east. He's a captain of the house guard in the service of Graf Ludwig Guenther. *Graf* means count, and he's the ruler of Schwarzburg-Rudolstadt. I suppose you could say that Grantville is now in the county of Schwarzburg-Rudolstadt.

One interesting thing I found is that the people in Schwarzburg all seem to refer to the Ring of Fire as "the pit." They saw the flash and heard the boom, same as we did, but to them, it was like a great pit opened up and there we were at the bottom. As near as I can figure out, the captain had the following subjects on his mind:

First, he is really worried about resupply. The Ring of Fire cut his primary supply line, and getting food in over the hills is going to be very expensive. Down in the Saale Valley they grow grain and vegetables, but up here in the hills the farming they do is mostly livestock. The economy is largely forestry and mining. I'm guessing that the Schwarza valley has always been a food importer.

Second, he is worried about refugees. We aren't the only ones worried about those raiders in the farmland to the north and east. They've driven people from their homes, and some of those have come up the Schwarza valley to the area protected by the castle. The resupply problem would be serious without the refugees, but with them, everything is worse.

And, of course, he's worried about us. I told him that we were worried about him too, since he has the high ground, but that I thought we were better off cooperating. I told him about the skirmishes we've had with the raiders, and said that we would do everything we could do to make sure that they never got through Grantville to him.

That led him to ask about our weapons. He said his scouts had been all the way around the Ring of Fire, or the pit, depending on whose words you use, and that they had heard stories about some of our skirmishes. All I had was a pistol, and I'm no great shot. I gave him a demonstration, then pulled the clip from my gun and let him handle it. He seemed fascinated by the idea of putting the bullet, powder and primer all together in one cartridge and also by the complexity of the pistol mechanism.

The captain was curious about what the power plant was, and I had no good way to explain that. He had already guessed that it was some kind of mill or forge. I told him that it was a mill, but that I didn't know how to explain what it was that we make there. All I could do is give him a name for it. So, now it is an *Electrischemühle.* I explained that when he sees bright lights at night, those lights burn the electricity they make there.

One thing the captain let slip may be of importance. The graf is away north, fighting the Catholic armies and trying to keep the Swedes out of his lands, despite the fact that they are officially on his side. So the captain is almost on his own. There is a garrison at Rudolstadt, and he's managed to reestablish communications with them.

I explained to him that the road crew would get to work Monday with his permission, to build a road up to Schwarzburg. Then I explained that it might alarm the Germans because we would use machines.

III. The Military Threat

I only went up to the castle when we took up bodies. Even then, I wanted to make sure we got the body bags back, so I didn't see that much. Yes, they have cannon, but how many I can't say. I saw only one, from a distance. It was tarnished to a brown shade that looked like brass or bronze and it had a barrel perhaps four feet long and a foot around at the breach. I couldn't see the muzzle or any cannon balls, so I don't know the caliber. It didn't seem right to be nosing into things like that, what with the job of getting the body out of the body bag and into a burial shroud.

IV. Church Relations

I don't know if anyone in Grantville has thought through what's going to happen between us and the churches of this land. I remember studying in Sunday School about the Reformation and Counter-Reformation and how hard it was for the Church to come to grips with religious diversity.

Pastor Decker didn't get to this subject right away, but you could tell from the way he asked it that the answers we gave would be important. He asked what religion we were in Grantville, after he'd noted that he understood that we were using the Gregorian calendar, which he thinks of as the Catholic calendar.

I explained that I was Catholic and so is Miles Drahuta, and then I had to ask around. Ron Koch turned out to be Lutheran, Brick Bozarth was Church of Christ, which I had to explain was another Protestant denomination, and Pete McDougal added to the confusion by saying that his wife was Catholic but that he was more of a non-practicing Presbyterian than anything.

The pastor wondered if the fact that more of us were Catholic than any other religion was the reason that Grantville used the Gregorian calendar. I explained that the whole world switched to that calendar long before I was born, not because of religion, but because it worked better than the old one.

The pastor was very confused by the fact that we could work and live together not caring that our neighbors or coworkers had different religions. It took me a while to figure out how to answer him, but I think my answer was good. I told him that we have only to look back on the Thirty Years' War and all the other wars of religion to see how failure to tolerate religious difference can ruin entire nations.

He asked how could I, a Catholic, justify helping to properly bury Lutherans, when my church had declared that they were certain to burn in Hell. I asked him how could I, as a Christian, refuse to help properly bury another human, as all of us are made in God's image.

He needed to probe the limits of our toleration, asking if we would accept Anabaptists or

Mennonites, to which I said that we would welcome them. He asked about Muscovites too, and it took me a bit to figure out that he meant Russian Orthodox. I told him that I thought that we had several Orthodox Christian families in town. Then he asked about Jews. I said that there was a Jewish family that had been in Grantville for many years, the Roths, and that the Abrabanel family had just arrived in town from Holland and already Rebecca Abrabanel is part of our government. He asked if I would tolerate the Jews if they came in numbers enough to build a synagogue, and I said of course. Then he asked about Turks, and I said that I didn't know if there were any Muslims in town but again, if they were there, they could build a mosque.

I think some of our clergy are going to have to get together with the German clergy and have some very long talks.

4

To be delivered to Martin Mühler at the Maegdleinschule, Eisfeld:

Written on this twenty-third day of May, in the year of our Lord 1631, or the second day of June in the Catholic calendar of Pope Gregory. I will explain in a moment why I mention this other date.

Martin, thank you for replying so promptly to my last letter. I wrote that letter in a state of great alarm. At the time I wrote it, I knew nothing about what had happened but what I could see with my own eyes. Now, Martin, I have actually been down in the pit and I have spoken with those who are within.

So much has happened since I last wrote. Captain Saalfelder of the castle guard has sent good men to scout around the place we at first thought might be the very pit of Hell, and even into the pit. We have found a roundabout way to get messages safely to and from Rudolstadt

Thursday, we had visitors from within the pit, and although they spoke mostly English and had almost no German, they had a letter written to the captain in excellent German. It was a most remarkable letter, claiming to be from the Grantville Emergency Committee and asking us for permission to build a road up the wall of the pit. The captain showed me the letter, and it was remarkable even to look at. The paper was the most perfect, and it was printed, not written, using a humanist style of type. The signature was even more remarkable—it was signed by a woman, Rebecca Abrabanel. Is that name not Jewish? Also, the letter was dated using the Catholic calendar!

As I wrote before, several houses fell into the pit when it opened. It has fallen on us to give a proper burial to those who fell in those first horrible moments that Sunday noon. Our visitors said that we were welcome to come down to try to find the bodies, and they said they would try to get us help. Friday morning, one brave man, the farmer Johann Schwarz went down. His wife was one of those lost. He came back, reporting that there were bodies. More important, he came back unharmed, so Friday afternoon, six of us went down.

More of us went back Saturday. Not too long after we had started, we were joined by five men from this strange new town of Grantville. Even the names of the men were strange, Mark O'Reilly said the name was Irish, Pete McDougal has a name befitting one of the Scots mercenaries this accursed war has brought to our land, and the names Brick Bozarth and Miles

Drahuta I cannot place at all. All of them were from this country called West Virginia, which is in a kingdom called the United States of America which is, indeed, in America across the ocean.

Everything about these men was remarkable. Their clothing, their tools, what they did first, how they worked, but at times, it was as if they were working miracles. This man Mark O'Reilly said that all of the others had been trained in rescue work because they were miners by trade. All of them had helmets and vests that were bright colors, so that if any of them needed to be rescued, they could be found easily.

The first thing they did was a great puzzle. Instead of joining immediately in the search they began to string ropes. Safety ropes, Mr. O'Reilly called them. Then they built a bridge across the foot of the great new waterfall the Schwarza has made where it falls into the pit. Mark explained that he did not want more people to die or be injured in searching for the dead. Indeed, these ropes and the bridge they built were a great help.

Their tools were amazing. The most fearsome was a saw. It sounds so simple to call it just a saw, because it had an engine on it that roared most unpleasantly. Although it was small enough to hold easily with two hands, it could cut through a tree as big around as a man in only minutes.

They had two of these saws and also a machine that was so simple that I believe one of our smithies could easily build one. They call it a come-along because it makes things come along. The machine had a lever, a ratchet, and a windlass drum, with cable and hooks, so that one man could lift a ton if he worked patiently with the lever and ratchet. The rope was made of steel wire, but that was the only new idea in this machine.

Their shovels were more finely forged than any shovel I have seen, but they were just shovels. By the end of the day, they had helped us recover five more bodies. Three of those would have taken days to get out without the saw and the come-along.

These men claimed special training in what they call rescue and recovery work, and they had with them two items that were horrible proof of that. They called them body bags. These were made of the finest oiled canvas, with a remarkable sliding fastener to hold each closed, and with many handles very finely sewn to the sides all around. These bags were good for only one thing, and that was for carrying the dead out of difficult places.

While I am talking about strange tools, I should say something about the engine that is even now being used to build the promised road up from the bottom of the pit to Schwarzburg. It is yellow, and the size of a small hut. For most of last week, it has sat beside a great pile of charcoal near a huge mill building not far below us, doing nothing. On Friday, though, a man came out of the mill building and climbed onto this engine, and it seemed to come to life with a rumble like distant thunder. It pushes things around. It has a great blade, like a broad shovel on the front, and it pushes with the power of many oxen. That first time we saw it used, it was put to use shaping that pile of charcoal.

Today, as I watch, there are just five men working slowly up the side of one of the mountains within the pit. They are using their marvelous saws to cut the trees in the path of the road they are building. Sometimes they use the come-along to pull the fallen trees where they want them. One of the men is working the great engine I mentioned. With this machine alone, he is doing the work of fifty or one hundred men cutting a road into the side of the mountain. I believe he will complete this road by noon, yet it must be almost a mile in length.

But, let me say more about my conversation with Mark O'Reilly. Although his German was not good, he had with him a remarkable little book, a dictionary. Part of it contained English words and their German equivalents, and part contained German words and their English

equivalents, all organized by the alphabet. There was one problem with this book. His dictionary contained German as it will be spoken more than three centuries in the future. With his bad German and this dictionary, however, we spoke of some of the most remarkable things.

One curious thing came out. I have been speaking of the pit, because from Schwarzburg, it appears that Grantville lies at the bottom of a great pit that has opened up in our lands. The people from Grantville refer to what has befallen them in different terms. They call it the Ring of Fire because, for a fleeting moment when their town was inexplicably transported to our doorstep, they were surrounded by a strange circle of fire.

They have no understanding at all of how this happened. Whatever devilment there is behind what happened, whatever God's purpose may be in this, it is no clearer to them than it is to us. They may have wondrous tools, and they do indeed appear to come from our future, but they are afraid of the same things we are., They fear not having enough food to eat, and fear that the war that is sweeping south after the fall of Magdeburg will consume them.

The people of Grantville know of the war that plagues our lands. They call it the Thirty Years' War, because, from the point of view of their future, it lasted thirty years. Mark O'Reilly says that this war murdered one third of the population of Germany. Yes, murder is the word he used. He said that, from this and other wars of religion, the Church of his day, not just the church of the popes, but also the many Protestant churches have learned that they must tolerate each other even when they disagree deeply about doctrine.

This is the most remarkable thing of all. In this town of Grantville, there are many Protestant churches and also a Catholic church. He said that the different churches disagree on many matters of theology, but that they have been there for many years, and living in peace despite these differences. All of them have used the Catholic calendar for many years, not because of any Catholic victory, but because they have agreed that Pope Gregory's calendar is more rational than the old calendar.

Among the men from Grantville working with us, Mark O'Reilly and one other were Catholic, one was Lutheran, one was Presbyterian, which I take to be a kind of Calvinist, and one from some Protestant group called the Church of Christ. Strangely, the Presbyterian said he had a Catholic wife, but even more remarkable than this was the fact that Mark O'Reilly did not know the religions of most of the men he was working with. He had to ask, and he only thought to do so in response to my questions.

I learned that there are indeed Jews in town. One Jewish family is headed by a goldsmith who has been a respected merchant in town for many years. This Rebecca Abrabanel who signed the letter we saw last week is indeed Jewish, but she and her father are from our world, from Amsterdam. You may measure the warmth of their welcome by the fact that she seems to have taken a very high seat on this emergency committee they have established to rule their town. Mark O'Reilly did say, though, that he thought the head of this emergency committee, a man named Michael Stearns, was some kind of Protestant.

Again, note my words. He thought. It seems that he has never inquired about this matter. I am not talking about a man who lacks curiosity or judgment. This man was most curious, deeply concerned about the safety of his men and of the men from Schwarzburg, and very interested to learn what I had to say. Despite this curiosity, despite being well educated, despite the fact that he had a sharp wit, he had never inquired. I can only conclude that we will find this Grantville to be very different from any place we have ever imagined.

Mark O'Reilly said that he was no scholar of religion, but he knew far more of the Bible than

the Catholic laymen I have met. When I questioned how Grantville's religions could be so tolerant, he quoted a document with which I am unfamiliar, saying that all men are made equal, but then he showed how this follows from the book of Genesis, since we are all descended from Adam and Adam himself was created in God's image. The logic of this argument is very compelling. If indeed every man is an image of God himself, not in the idolatrous sense but because that is indeed how God made us, then indeed, it would be disrespectful of God himself for us to treat each other with anything less than respect, even when we may disagree deeply.

Martin, as a brother in Christ, as my roommate of many years when we studied together in seminary, I beg your help in trying to digest what has happened here.

I write as your most humble and troubled friend, Hermann Decker.

Susan's Story

By Paula Goodlett and Gorg Huff

Grantville
August, 1632

"I don't know about you, Susan," Tina said, "but I'm getting out of here before she wakes up. The last thing I want to deal with is Mom and one of her weepy hangovers."

"C'mon, Tina. The hangovers are easier to live with than what's really going to happen today," Susan remarked, resignedly. "Considering the racket they made last night, today's performance will be the 'I'm so embarrassed' show. Or maybe it will be the 'I have a right to a life of my own' show. Again."

Deepening her voice, Tina announced "Welcome, viewers, to *One Life in Grantville* starring . . . Veeelllmmmaaa Hardesty!"

Pretending their life was just a soap opera helped them handle some of their mother Velma's more outrageous actions. It gave them something to laugh about in a life that had become more and more difficult. Susan continued their usual routine with: "In today's episode the adventure continues. Will Velma find the man of her dreams? Or, will she continue her never-ending search? Tune in tomorrow . . ."

Susan stopped abruptly when she saw the tears in Tina's eyes. "Don't, Tina," she pleaded. "It doesn't help to cry. We figured that out years ago."

Tina wiped her eyes with the back of her hand and sniffed. "It wasn't so bad before the Ring of Fire. Mom at least tried to act sort of respectable back then. Now she's not even trying. People are noticing and starting to make remarks."

"Yeah, I've heard them, too. It's not like we can even hope to grow up and move away to start over. With only about three and half thousand up-timers, someone will always remember who raised us." Susan looked intently at Tina, forehead creased with worry. "Let's grab a few things and go see Grampa Fred. I have an idea."

"Will it get us out of this trailer and away from Mom? Will we be able to escape this constant parade of admirers?"

"Maybe," Susan answered. "I hope so. Mom's just getting worse and worse. Maybe Grampa can help us find a way."

* * *

"Grampa, we need to talk to you."

Fred Logsden's face lit up when he saw his granddaughters. There hadn't been much happiness in his life lately. His wife, Susan, had died a few months ago, leaving him alone in the house. The rumors surrounding his former daughter-in-law were another cause for concern. Young Susan and Tina were his closest family since the Ring of Fire had left his son, Carney, back up-time.

It was hard to tell the girls apart if you didn't know them. They both had long honey-colored hair and were nearly the same height. Tina at sixteen was just a bit taller and more finished looking than her sister. Susan, two years younger, seemed to be balanced on the edge between child and young woman.

"Girls, come on in." He opened his arms for hugs. "It's so good to see you."

Released from the three-way hug, Susan looked around the small living room. "Grampa, if Gramma Susan could see this place she'd be chasing you with a broom. It's a mess! Why don't you hire a housekeeper?"

"Because I don't want some strange woman running around my house clucking at me," Fred remarked. "I pick up every day or so. Just leave stuff alone."

"Nope," Tina and Susan said in unison, as they swept through the room. As Fred watched in surprise, order emerged from chaos. In less than ten minutes the dirty dishes were soaking, the piles of clothing and papers were sorted and put away, and the furniture was dusted.

"We'll finish it later, Grampa," Susan said. "Right now we really need to talk to you. It's pretty important."

"Is Velma at it again, girls?" Fred asked.

"Yesterday she had beer for breakfast. She says she can't afford coffee, but that's just an excuse." Tina grimaced. "She drinks off and on all day and then brings a man home every night. We never know who's going to be there when we wake up. Last week, one of Mom's men tried to open our bedroom door. We always lock it, but the door itself isn't very strong. He was probably just trying to find the bathroom, but it still scares me, Grampa."

"Mom never has had any sense about men," Susan added. "The Ring of Fire just gave her a reason to act stupid here at home. She can't just hop in her car and go to another town anymore. We've got to do something. Why should we have to live with this? It's wrong, Grampa. Mom can live the way she wants to, but Tina and I shouldn't have to be afraid to get up and go to the bathroom at night."

"I heard she was running pretty wild lately, girls. I didn't realize it was that bad, though." Fred's grizzled face showed his distress. "I guess when Cory left with the Army and Pam moved out, Velma must have thought you two were too young to realize what was going on."

"You mean that Mom wanted us to be too young to understand," Tina said. "She's acting like some kind of tramp. We're not too young to know what that means. I'm over sixteen, Grampa. I could quit school and get a job if I wanted to. The only reason I haven't tried to leave before is because it would leave Susan alone with Mom. I'm not going to leave her there, by herself, with Mom acting this way. Especially not while some of those guys seem more interested in Susan than they do in Mom."

"Why would they be interested in Susan?" Fred asked. "Are they thinking she's, she's—!?"

"No, it's not that. It's the money," Tina explained. "She's got a lot of money now, since she sold the Barbies. Mom never pays any attention, so I don't think she even knows about it yet. It makes me wish I hadn't broken all of my dolls."

Fred looked at the younger sister. "Susan, are you one of those 'Barbie Dolls' I've been hearing about? The little girls who got rich from selling their toys?"

"We don't call ourselves 'Barbie Dolls,' Grampa. We're the 'Barbie Consortium.' We took the money from the sale of the dolls and invested it. We even hired Helene Gundelfinger to do the legal stuff. We tell her what we want and she buys stock for us. Right now I have a lot of stock, but no cash. Helene says if I leave the stock alone I'll have a lot of money someday. Right now, I'd have to sell some stock to get any money.

"A couple of Mom's boyfriends seemed to think I could give them an edge with Other People's Money. I can't, really. They need to talk to Sarah or David. I don't know enough about business or technical stuff yet. Grampa, all I really want to do is finish school and lead a normal life. Mom's making that impossible. Can we come live with you?"

"Well, it's been pretty lonesome around here since your Gramma died. I'd like to have the company, but Velma always insisted on keeping you with her. She got pretty mad when your dad tried to get custody after the divorce. I'm pretty sure she hasn't changed her mind about that."

Fred paused a moment. Velma had put on a good show during the custody battle. Enraged that Carney had called her an unfit mother, she had pulled out every trick she knew to disprove his statement. Somehow, she had managed to look like a respectable and caring mother. The judge had ruled in her favor.

Fred shook his head, and brought his mind back to the present. "Still, times are different now. You two aren't safe living with Velma. Let's go talk to Maureen Grady. She works for the Child Protection Agency. Maybe she'll have an idea."

"We brought overnight bags, Grampa. Mom won't even notice we've left yet," Tina said. "And we're not going back there. If Mom decides to get nasty, we'll just have to get nasty right back."

* * *

Maureen Grady wasn't much help.

"I understand the way you feel, girls," she'd said. "I really do. But you aren't being abused according to the law. I can't take action against Velma when nothing bad has happened. Taking lovers isn't against the law."

Fred Logsden was nearly engulfed in rage.

"You mean to tell me that we can't do anything to protect these girls? We have to wait for one of them to be raped or beaten?"

"Fred, all I said was I can't take legal action against Velma. I didn't say we couldn't do anything. First of all, we can petition the court to emancipate Tina. That won't be a problem. She's over sixteen and you can hire her as your housekeeper, so she'll have a job."

Maureen pursed her lips in thought and continued, "The real problem is Susan. She may be rich but she's too young for legal emancipation. If we don't want to leave her with her mother, we're going to have to think of something else. I'm going to have to ask Maurice for a legal opinion. Will you three be okay for day or two? Judge Tito is really busy right now."

"We'll manage, Maureen. Just try to get it cleared up soon. Velma may be drinking too much right now, but she's bound to notice that the girls haven't been around much. Sooner or later, I'll be getting an unpleasant visit." Glumly, Fred muttered, "I'm not looking forward to it at all. Velma's a holy terror when she's mad."

* * *

The holy terror was unleashed two days later.

Velma punctuated her screams of "You rotten bastard" and "Lousy, no-good, piece of shit!" with thrown pots, pans and crockery. This fellow had gotten overconfident and asked about Susan and the money Velma hadn't known about. Velma's reaction was not what he expected.

She stood with her ample chest heaving and watched her latest lover high-tail it out of the yard. Still incensed, she threw one more pan at the fleeing figure. "Don't ever come back, you bastard!" she screamed.

The sound of a laugh being choked off made Velma realize that she was standing in full view of a large number of neighbors. Worse, she was wearing a skimpy teddy and a sheer robe, which were giving her audience quite an eyeful.

Drawing herself to her full height, Velma stared directly at the crowd. "You just wish you looked this good, you old bats." She turned to go indoors.

After slamming the door, Velma headed for the shower. "They'll be at Fred's," she steamed. "They always run to Fred."

* * *

Forewarned by a timely phone call, Fred, Susan and Tina decided to wait on the front porch. Velma's tendency to make scenes in public would cause her to call them outside, anyway. This way, she might be confused for a moment.

"Time's run out, Grampa," Susan said. "Here comes Mom."

Following the direction of Susan's gaze, Fred immediately understood the concern in her voice. Velma was clearly "loaded for bear" today. Fred had to admit that Velma looked younger than her forty-four years, but he didn't really think the mini-skirt and tank top were appropriate wear for a Sunday. Then again, Velma hadn't set foot in church in years.

"Do you two want to go inside?" He asked. "I can handle this alone."

"No, Grampa," Tina answered. "We're the reason she's here. She may as well hear it from us."

"There's going to be a big scene, you know," Susan remarked. "This time the 'tragically deprived mother' show isn't going to work."

"What's all this 'show' you two talk about?" Fred asked. "I feel like I've walked into a soap opera."

"We feel like we live in a soap opera, Grampa." Susan explained. "We started naming Mom's scenes a year or so ago. It gave us something to laugh about when she embarrassed us."

"That show just got cancelled, girls," Fred stated firmly as Velma finally reached the front walk.

Velma immediately began the confrontation. Standing with hands on hips, she barked: "You two might as well go get your stuff. You're coming home with me, right now!"

"Afternoon, Velma," Fred said, calmly. "Would you like to sit down and have a cup of coffee?"

"There won't be time for that, old man," Velma snapped. "We're going home, now. And when

we get there, Susan, we're going to have a little talk about all this money you seem to have."

"Is that what you want, Velma?" Sounding calm was already becoming an effort, but Fred wasn't going to let his anger show. "Susan has money now, so you'll pay attention to her? Or do you plan to get your own hands on it?"

"She's my daughter. I've supported her all her life. She can just pay some of that back, can't she?"

"No, Velma," said another voice. "That isn't the way it works."

The trio on the porch started in surprise as Judge Maurice Tito walked up beside Velma and took her arm.

Maurice Tito hadn't been a judge before the Ring of Fire. The acrimonious divorce and custody case of Velma and Carney Logsden had been a nine-day wonder at the time, so he hadn't been able to not hear about it. Still, he believed in family and had been prepared to listen to Velma until a moment ago. Velma's willingness to rob her own daughter of her future, stated boldly and publicly while she stood on her father-in-law's front porch, had caused a rapid change in his evaluation.

"Come inside, Velma, before you embarrass yourself in public again today." Judge Tito said. "Everyone, inside please. Fred, I'll take a cup of that coffee you offered."

Susan and Tina went inside with Fred, as Velma continued to struggle and try to pull away from the judge.

"Inside, Velma," he said firmly. "You're going to sit down and have a normal conversation. No dramatics, no fits and no screaming, period."

"You can't do this, damn it!"

"Yes, I can. We can go inside and do this quietly, or we can do it in court tomorrow, Velma. It's up to you. I warn you, you won't like it if you force me to convene the court." Judge Tito looked sternly at Velma. "Your little business this morning caused about six phone calls to my house. No one in town appreciates the way you've been acting. Now, shut up and get inside."

Susan and Tina had poured coffee for everyone and were sitting with Fred at the kitchen table when Judge Tito and Velma walked in. Velma took a seat at one end, while the judge took the other end.

"This isn't actually a courtroom, but I'm the Chief Justice for Grantville now, so it will do. I'd like to do this and get home to spend some time with my family, so I don't want to hear any arguments." Judge Tito opened his briefcase. "Velma, in case you haven't noticed, times have changed. We aren't living in the safe world we had before the Ring of Fire. We just can't afford the sort of shenanigans you got away with back up-time. Not when kids are involved."

He cleared his throat, and spoke the next words in a more formal tone of voice. "Tina Logsden, I understand you're now working as the housekeeper for Fred Logsden. Is this correct?"

"Yes, sir," Tina stated.

"It is therefore the determination of this court that your petition for emancipation be granted. Here's your paperwork. Don't lose it, okay?"

Judge Tito turned to the younger sister. "Susan Logsden, I'm told that you have a net worth that exceeds my own, is that correct?"

"I'm sorry, Judge, but I don't know your net worth, so I can't say. I have a lot of investments and I can show you the last quarterly balance sheet, if you like."

"No need, Susan. Maureen got a copy from Ms. Gundelfinger when she briefed me on the case and asked for my opinion. Considering what I heard on the porch just now, it's clear that leaving you in Velma's care isn't in your best interest."

Judge Tito gave Velma a hard look and sorted through some more documents. After placing two sheets of paper in front of Velma, he said, "Two things can happen now, Velma. You can sign the papers to give Fred custody of Susan. That's this paper right here. If you sign it, Susan lives with her grandfather and there's no issue of child support."

Pointing to the other document, he continued, "Or, Fred can petition the court for custody and child support. That's this paper. I can promise you this, Velma, if I have to waste a day in court you aren't going to be happy. You might have enough money left for food, but paying child support won't leave you enough for very much else."

After placing a pen on the first document, Judge Tito asked, "Well, Velma, what's it going to be? A nice, quiet change of custody or a court battle you won't win?"

Hands shaking, Velma signed the custody order.

"Velma, you can go home and live any way you want to now. I warn you though, don't try to cause these girls any trouble. This is a protection order for them," the judge said, as he filled in the blanks of another sheet of paper from his briefcase. "Now, business being finished, I'm going to drink this coffee and go home."

Judge Tito did exactly that, as Velma sat stunned in her seat.

Fred, Susan and Tina continued to sit quietly after the judge left and waited for Velma to react. It took a few moments, but tears eventually began running down Velma's face.

"Don't bother with the tears, Mom. We've seen them before," Tina said. "It's not going to work this time. And please remember what the judge said about causing trouble."

"You know you don't really want us," Susan told Velma. "We've known it for years now. All we want is to live normal lives. You wouldn't let that happen, with your drinking and your men. Just leave us alone, please."

"My own daughters don't want me around. Fine, I'll go," Velma began to rant. "I'll go home and throw all your stuff outside. Don't come to me for any help when your lives go down the toilet."

"Don't bother with that, either, Velma," Fred interjected. "As soon as we heard you were coming I called your sister, Betty. She went in and got all the girls' things. There's nothing left for you to damage, and there's no one left who wants to deal with you. Betty didn't even want to set foot in the trailer. She only did it as a favor for Susan and Tina. You've burned all your bridges, Velma. Go home and live with that."

Velma stood and threw her coffee cup at Fred. Fred barely managed to catch it and set it on the table. "Go away, Velma," he said. "Just go away."

Tina, Susan and Fred kept their faces expressionless and waited for Velma to leave. After a searching look at each of them, Velma seemed to deflate and suddenly looked much older. She turned away and left the house.

After a few moments silence, Fred looked at the girls and grinned. "Well, that was easier that I thought it would be. Welcome to your new program, girls. What do you think we should call it? I vote for 'Grampa knows Best.' Or maybe 'Rin Tin Tito.' What about you?"

Susan, still a bit shaken by events, began to smile. "Neither one, Grampa. We don't have to

call it anything. It's going to be just a regular life."

Of Masters And Men

By Karen Bergstralh

November, 1631

Master Carpenter Herman Glauber walked from the open door to the forge in the blacksmith shop Martin Schmidt ran for him. Putting down his bulging briefcase he stood warming his hands above the coals. Glauber nodded pleasantly at Martin and, looking around the shop, beamed.

"Rolf, Jakob, finish these up and then take your lunch. Forging the rest of the blanks can wait." Martin dismissed the two youngsters and walked over to greet his boss. His stomach turned over as he wondered what new scheme Herr Glauber was going to present.

Normally the only thing Glauber's schemes had in common was that they made money—often a lot of money—and required a great deal of labor for everyone involved. Few had any connection to carpentry. The master carpenter was involved in many little ventures and each one appeared to lead to others.

The Americans had a phrase for it: *a finger in every pie.* Martin would admit Herr Glauber did his share of the labor. "Hard work and new ideas make for wealth" was Glauber's favorite saying. In truth, judging from results, the man was right. Still, Martin often wondered if he would ever get used to Herr Glauber or, more rightly, Herr Glauber's enthusiasms.

"Good day to you, Herr Glauber."

"Good day, Herr Schmidt," Herman Glauber said pleasantly. "Might we talk in your office? Today is cold, and while your forge is warm I'd like to talk somewhere out of the draft."

"Certainly, sir. Will we be long? If so, I'll send Rudy to fetch sandwiches and beer." Martin eyed his staff—all visibly interested in what Herr Glauber might say.

"Excellent idea! Yes, I think this might take some time." Herr Glauber smiled and rocked back and forth on the balls of his feet, giving the impression of barely suppressed energy.

Turning back to his crew Martin called out orders. "Rolf, spend the time between lunch and class working on your math. I expect a better grade this semester. Jakob, take those steel rings down to the harness shop and see what else they need. Your math also needs some work. See that you spend the rest of the day on it. I want to see your homework tomorrow morning, before you go to class. Rudy, here, take this and get a plate of sandwiches and a keg. Get a sandwich for

yourself while you are there. You will have to hurry or you will be late for your classes. Max I'd like you to go out to the steel plant and find out what is holding up our order. Carl-Maria, the laundry people have some problem, would you please find out what they want? I think you will find Adolf Glauber there." Martin glanced at Herr Glauber and seeing his nod continued. "He should know about their problem."

Herr Glauber watched silently as the staff of *Kudzu Werke* scattered. When the two men were alone he turned to Martin and asked, "Masterfully done! How long will we be alone?"

"It will take Rudy about three quarters of an hour to get to the Gardens and back if he hurries. After he's gone we'll have about two hours before the cleaning crew comes in. I can send them off if you need more time."

"No, son, we shouldn't need that long," Glauber said, as the two walked toward the shop office. "I do hope I've not put you off schedule with my visit?"

"No, sir. Actually this break is good for the men. Things have gone very well and we are ahead of schedule on everything. If Max can kick a few lazy dogs into delivering our steel we will be further ahead. That is why I've not started a second shift yet."

"Ah, yes. That is good news. No need to add bodies and cost until you need to. What about the MaidenFresh problems?"

"I'm sure Adolf has told you about those. Most of it is extra hooks and tongs but from what Adolf said I think they have a problem that will need pulleys. Carl-Maria is good at designing lifting systems. Here, sir, please take this chair." Martin pulled out an up-time high-backed office chair for Herr Glauber. Glauber paused, staring down at the chair thoughtfully. A sly grin flashed across his face as he sat.

Closing the office door, Martin sat behind his desk and began clearing the litter of drawings and paperwork. He knew that the contents of Herr Glauber's overstuffed briefcase would soon be scattered across every inch of it. Martin considered the briefcase as Herr Glauber's declaration he was no longer just a master carpenter but now a man of business.

A *Grantville* man of business, for Martin could not remember ever seeing anything like that briefcase before. The briefcase itself had started life as an up-time Boy Scout project, earning a leatherworking badge. The Boy Scout's father had used it to carry his lunch to the mine and proudly endured his friends' ribbing over his "executive lunchbox." By the time of the RoF the father was dead and the grown-up Boy Scout had moved away from Grantville. Herr Glauber had found it while cleaning out an attic during another of his projects. The house's owner had explained its history and its intended purpose. As his son Adolf told the tale, Herr Glauber had been enchanted.

"Others," Adolf proclaimed, "may believe in magic rings or spears. Father seems to think there is magic in that case. He may be right. Since he got it, all his little ventures are doing well."

Instead of the expected blizzard of papers, Herr Glauber plumped down a thin book. No, not a book, but what the Americans called a "magazine." The cover had a color picture of a huge up-time room centered on a massive stone fireplace and full of furniture.

"This house, imagine, *this very* house sits not three miles from here." Herr Glauber's callused fingers thumped down on the picture. "And," he said as he flipped the magazine open, "Sliding Rock Farm is full of wonderful furniture. Just look at the furniture!"

Glauber turned the pages slowly, pointing out particular favorites and rhapsodizing about the clean lines and deceptively simple designs. Martin looked and saw what appeared to be

handmade hardware on the chests and cabinets. In one picture, a chandelier of iron and wood hung on pulleys over a massive table. He started to trace the lines of the ironwork with his finger but jerked his hand back. His hands were grimy from working iron, hardly fit to touch this marvelous picture.

"Ha! That's got your attention! Thought it might." Herr Glauber was grinning like a fool but Martin didn't take him for one. Never. No matter how Herr Master Carpenter Glauber might laugh or grin or caper about, the man was no fool. He did wonder, especially about his own part in Herr Glauber's schemes.

"Well, Journeyman Schmidt, can you and your shop build something like this?" he asked in a challenging voice.

Martin peered down at the picture, drinking in the details. "Yes . . . I need to see more of the details, but yes, I believe I could."

"How about the fittings on this chest?"

"Oh, yes. That's pretty straightforward. I think even Rolf or Jakob might make such with a little guidance. They would enjoy it, a break from the tedium of nuts and bolts." Martin mused. "Depending on how many you want, we'd have to expand the shop."

"Ah, good man! Yes, I'm setting up a furniture shop to build this type of furniture. We'll have to have hardware—and who better to make it than our own blacksmith shop?"

"I'm curious, sir. Who will buy such furniture? I mean, it isn't fancy looking

so . . ."

Martin had learned to respect Herr Glauber's ideas, for hardly a one had failed so far. Several, such as this blacksmith shop, were paying off very well indeed and even the failure might make a profit in the end. Still, the furniture pictured in the house looked plain and severe, especially compared to some pictures on other pages.

"A point, son, a point. Who will buy my American furniture? Well, first, most of it will not be overly expensive, thus any good solid farmer with a little extra money can buy a piece or two. His wife can proudly show it off to her friends and relations. In turn those friends and relatives will want a piece or two for themselves."

Glauber smiled and thumped the magazine. "This furniture has the advantage of being sturdy and the cushions are covered with good strong leather. A man can come in from the fields and sit down in comfort and his wife will not fuss at him."

Flipping a few pages he found pictures of the dining room and commented, "Think how a table such as this with this set of handsome chairs will look when the relatives come to dinner. Our good farmer's wife will have little trouble keeping it clean and nice looking. That's one market. It will be small and local to start but from small beginnings can grow big profits. As for other markets, there is a great curiosity about Grantville and the Americans. Right now almost anything 'American' sells for a good price among the wealthy and the noble. That lawn chair we pulled from the old shed is an example. I had it re-made using colored leather strips in place of the old plastic. It now resides in Jena under the backside of the dean of the Law faculty. He paid a nice price for it, more than triple what it cost to replace the seat. While I was selling it I was asked about providing a table and chairs with suitable gravity and grace for a scholar's dining hall. I'd been out to Fraulein Clark's house to make some repairs and I thought of this table immediately."

"But if you make a copy of this it won't be a real American table . . ." Martin mentally kicked

himself for forgetting the demand for "real" American items. Even he wasn't immune—in his pocket was an up-time pocket knife,

"Ah, you forget. We are all Americans now! Besides, every one with an ounce of sense knows there is a limit to the number of up-time items. What I will give them is a table in the same design, the same materials, and made in Grantville. What could be more American than that? Besides, when I talk to prospective customers, I will have this magazine to show them. Not only will my furniture be from American designs, but this also shows it was used in the homes of very rich Americans. This magazine, from their universe, will show what was good taste in house designs and furniture. When Fraulein Clark gave it to me she told me all about it. All the wealthy and important people wanted their houses shown off in *Architectural Digest*."

"I see." Hearing the outer door open, Martin looked up. "Ah, Rudy is back. He must have run both ways. In here, Rudy!" Relieved to have a time to think about what he'd just heard, Martin smiled at the teen.

"Your sandwiches, sirs. And a keg of the good Oktober beer." Rudy cheerfully placed a bag and the small keg on the desk. He craned his neck, obviously trying to look at the pictures in the magazine.

"Here, Rudy. What do you think? Can you make something like these hinges?" asked Martin, imitating Herr Glauber's earlier question.

"Oh! Yes sir! But . . ." the young man peered closer at the pictured cabinet. "Why didn't the smith curve this part up?"

"Simplicity, boy," Herr Glauber stated, peering closely at the young man. "The point of the design is simplicity and the beauty of the materials and workmanship. The up-timers call this style 'Craftsman.'"

"Yes, sir. It's easier to hide a problem if the design is really fussy. Simple makes an error stand out." The boy flashed a glance Martin's way and Martin remembered when he'd made just that point.

Rudy, back to concentrating on the pictures explained, "This looks like the smith just cut it and never finished it off. If you made this a nice gentle curve on both sides it will look nicer, not so unfinished. That's not fancy, just finished looking. Here, like this on this chest here." Rudy pointed to the other page and both older men looked carefully.

"Martin, I think your young man is right. It would look better and it isn't fancier." Herr Glauber smiled up at the boy.

"And I think we've found the craftsman for your furniture hardware." Martin smiled also, his mind racing. "Rudy, can you shift to night classes at the end of the semester?"

"Yes, sir!" The boy sucked in a breath. "Does this mean I get to make this kind of stuff? All by myself?"

"Yes, you get to make 'this kind of stuff,'" Martin replied, trying to keep his voice stern while watching the joy in the boy's face. "Not all by yourself, not at first. Later, if Herr Glauber's furniture sells well and you do well in your classes . . . You may end up making furniture hardware all by yourself."

"Does this mean I'll be a journeyman?" Rudy asked breathlessly.

"Yes, yes, it should. You'd better head off now or you will be late for school. For now say nothing to the others. I'll talk to everyone tomorrow morning."

"Yes, sir!" The delighted boy spun around and raced out of the office.

Martin stared ahead. Here now was a problem. . . .

"You are worried, my friend Martin," Herr Glauber said. "Is it about how the rest of your men will take to Rudy doing furniture hardware? Here, take a sandwich and fill a mug of beer for me. All our talking has made me dry."

"Yes, I am worried. Not about the rest of the men. Carl-Maria and Max are journeymen already. They've both commended Rudy's work. They won't be a problem. Jakob and Rolf are promising, but their work is still apprentice-level. Rolf won't be happy because he's older but he knows Rudy has more skill. Still, this brings up a problem. None of the boys are properly apprenticed. I cannot apprentice them, as I'm only a journeyman myself. And I certainly cannot raise Rudy to journeyman status."

Glumly considering these problems, Martin tapped the keg and filled two mugs.

"Ah, yes. Your status," Herr Glauber stated gravely. "Master Blacksmith Hubner has stopped claiming you are not a proper journeyman, at least."

"Oh, yes. He's choked properly on that letter you had from Masters Ritterhof and Eisenbach. Still, he's not happy with a journeyman running this shop. Especially when that journeyman is me."

"No, I've been accosted by him on more than one occasion about it. He'll not help raise your Rudy to journeyman. Fortunately there is another master blacksmith who can." With that strange statement, Herr Glauber deliberately took an immense bite of his sandwich and began chewing slowly, his eyes dancing.

Baffled, Martin tried to decipher these cryptic remarks. The only other master blacksmiths in Grantville were all close friends of Herr Hubner. Not one of them so much as acknowledged Martin when passing on the street, so it was unlikely they would help.

At last Herr Glauber finished chewing and took a long slow swallow of beer. "Ah, that's good beer. I wish I'd had enough forethought to get in on the partnership at the Gardens. Still, I am working on the building so not all profit is lost. And, I think some of these tables and chairs would do well in a beer garden."

A sly grin shifted on Glauber's face into a solid, wide grin. "Puzzled, aren't you? And you can't figure out which question to ask me first, can you? Well, Journeyman Martin Schmidt, I've had a letter. Or I should say another letter. A letter from Master Blacksmiths Bruno Ritterhof and Joseph Eisenbach."

His spirits lifting, Martin leaned back in his chair. Clearly whatever the two masters had written was good news or Glauber wouldn't be grinning. Still, a few small butterflies fluttered up from his stomach and into his throat.

"My good friends and fellow masters have decided to make a trip down to Grantville." Glauber passed his mug to Martin and waited until it was refilled before continuing. "They will be here sometime next week and they intend to stay for some time—to settle a few problems, is what they wrote. It seems that Hubner has written them, repeatedly and at great length, complaining about you and about my 'interfering' in blacksmithing matters."

"Oh." A sick feeling began to settle at the bottom of Martin's stomach. A master's complaint about a journeyman hardly boded well for the journeyman. Even if the journeyman was in the right, masters stuck together.

"It would seem that Herr Hubner has failed to understand certain points. Firstly, Bruno

Ritterhof and I are old friends, very old friends. And we are related. His sister was my lovely Maria. Joseph Eisenbach is my cousin, my mother's oldest brother's son. I first wrote them about Grantville back in June. Since then they've also had word from others they trust. Neither of them are very happy with the way Hubner and his friends have behaved." Peering over the top of his mug, Glauber appeared to measure Martin's reaction.

"I see . . ." was all Martin could manage.

"It is masters' business, still, I think you deserve to know about it. Bruno and Joseph are not alone among masters in disliking Hubner's behavior. They are coming as an official delegation. Hubner will have to answer questions before masters of his craft. Unless the man is a total idiot he'll manage to wriggle out of anything beyond a fine or two. Do you think Hubner a total idiot?"

"Ah, well, ah . . . sometimes. If his temper is up. Later he often seemed to,

ah . . . regret what he'd said."

"And his temper flares up quickly and hotly, especially if his actions and meanings are called into question. Am I correct in my assessment? I have met the man several times, you know. From what I've seen he takes any questions about his work as a personal attack on himself."

"Ah, yes. Quick and hot." Martin squirmed a bit, uncomfortable about discussing a master of his craft in such a disrespectful manner. What the devil could Herr Hubner's temper have to do with anything?

"I think I will take Bruno's offer up and sit in. Herr Hubner may provide quite a show." Glauber grinned again and passed his mug back for more beer. "Bruno sent his greetings to you. He is full of praise for your work and states he is anxious to see this shop. Joseph has expressed similar thoughts. I think you will enjoy showing them what you have done with *Kudzu Werke*. I see no problems for Rudy if his work is up to your standards. Little side matters such as advancing a deserving young man to journeyman—well, I don't think they would have a problem with such."

"Oh, sir! It will be great if Masters Eisenbach and Ritterhof could confirm Rudy as a journeyman! Rolf and Jakob would still be without proper apprenticeships but maybe . . ." Martin took a large gulp from his own mug. The sour, sick feeling in his stomach eased.

"Oh that! As for the boys' apprenticeships, you will be able to deal with those yourself, Martin."

"But, sir! I'm only an journeyman . . ." A thought struggled out from the back recesses of Martin's mind. A thought, a hope, a wish. "Sir?"

"Is your mug full, Martin? Right then. A toast to the newest Master Blacksmith—Martin Reinhard Schmidt." His grin splitting his face, Glauber saluted Martin with his mug full of beer and drained it in one gulp. "Here, son, I've letters and documents from Bruno and Joseph for you."

Stunned, Martin reached out his hand, letting the remains of his sandwich fall to the floor. Purring loudly at the largess, the shop's cat pounced and dragged the gift under Martin's desk.

Murphy's Law

By Virginia DeMarce

Part I: Grand Scam

Spring, 1634

"I have to decide within the week," Leopold Cavriani said. "I have no hesitation, of course, about leaving my daughter Idelette here with the Reverend and Mrs. Wiley. She will learn practical business from Count August von Sommersburg's factor, the count being one of the clients I am serving as a consultant. However, the question of her preparation in the theory of mathematics and accounting as applied to business still remains. The thought of apprenticing her to another woman is one that appeals to me. Your up-time concept of 'role model.' However . . ."

"I can't tell you whether Aura Lee would be a good person to apprentice your daughter to, Mr. Cavriani. I've only got an eighth grade education. She's got a degree from WVU and she worked for the state government for years before she married Joe. Then she worked for the county right up until the Ring of Fire. I can't judge how good she is at her work, but they kept her on at those two jobs. They were the only ones she had during twenty years. She wasn't what they call a job-hopper." Juliann Stull looked across the table at Inez Wiley and Leopold Cavriani. Cavriani noted that the woman did not have the near-perfect teeth of so many up-timers. Hers were crooked and discolored, one of them visibly missing.

"I can talk to other people in regard to your daughter-in-law's professional qualifications," Leopold Cavriani answered. "But in regard to Idelette's training here in Grantville, I am concerned with more than that. Mrs. Wiley does not personally know the younger Mrs. Stull well." He smiled. "She did, however, suggest that no one is likely to have a more realistic appraisal of a woman's character than her husband's mother. Perhaps, even, a critical appraisal. I have learned a great deal about Mrs. Aura Lee Stull—that, for example, she is one of the daughters of Willie Ray Hudson of the Grange and thus stems from a family of political influence in Grantville. I am concerned now with her . . ."

"Morals." Inez said flatly. "Ethics. 'Role model' in that sense, as well as her education and social status. Mr. Cavriani is concerned about his daughter's well-being in all ways."

"If you're thinking about that story that went around, about what happened at the restaurant in Fairmont," Juliann answered, "it's true. That's exactly what they did, her and Joe."

"If you might pardon my ignorance," Cavriani said, "what story?"

Juliann leaned forward a little, her arm resting on the back of her chair. "It was in September. That would have been 1987. Joe called and wanted us—me, Dennis, Tom and his wife and Harlan—to come over to dinner at a fancy restaurant in Fairmont. When we got there, it was all set up. Not one of those banquet rooms but a big table set up in the regular dining room. Flowers and candles on it and stuff. With Willie Ray and Vera, Debbie and Chad, Ray and Marty and their kids arriving at the same time and the waitress taking them to the same table. And I thought, 'Oh, hell and damnation.' Pardon my French, if you will, since Methodists aren't supposed to cuss. Not even to themselves."

The heavyset old woman paused and took a drink from her root beer. For her, Cavriani thought, "old" was the right word rather than "elderly." The mother of Chief Justice Riddle, the formidable head of the Grantville League of Women Voters, was "elderly." Eleanor Jenkins, the president of the Red Cross, was "elderly." Juliann Stull was just old. Old and worn, in the way old people were worn in his own seventeenth century. She was over eighty, Mrs. Wiley had told him. Tough, but old.

"So we sat there," she continued. "The waitresses brought salads and everybody sat there being real polite about what they said. Then the waitresses brought roast beef and baked potatoes with broccoli and everybody sat there being real polite some more. It's not as if the family of the state representative had a lot in common with the family of a miner who got crippled up with black lung, started drinking too much, ran out on his family, and died in a flophouse in Florida fifteen years later. I was a cleaning lady when Joe was growing up, working two jobs to keep food on the table. The only reason I ever knew that Garland had died was that the black lung people in the regional office in Parkersburg tracked me down and told me I was entitled to widow's benefits. But everybody was real polite. Especially because the restaurant had a lot of perfect strangers in it who were eating their dinners, too. Which might be why Joe and Aura Lee had the table set up out there instead of in a banquet room."

"I think I can visualize the scene," Cavriani said. He was also keeping in mind that this woman's son Joe was currently serving as secretary of transportation for the State of Thuringia-Franconia and had become, since the Ring of Fire, a man of considerable political importance and influence in his own right, given the importance of roads and railroads in the new world that was developing. Owing little or nothing to his father-in-law's influence. From the origins his mother was now describing. With Marcus von Drachhausen, the noble son-in-law of Count August von Sommersburg, who was in turn one of Cavriani's own employers, serving as deputy secretary under him. Wheels within wheels . . .

Juliann heaved herself to her feet. "I don't mean to be rude by standing up, but I've got to straighten this bad leg out every now and then. Then, the waitresses brought the pie and coffee. Before people could go on being real polite, Joe got up and said that he and Aura Lee had gotten married at the courthouse in Charleston the week before. That the state transportation department had transferred him from Clarksburg to Morgantown, that Aura Lee had quit her job with the state and gotten on as a budget officer for Marion County, and that they'd bought a house and would be living in Fairmont."

Inez Wiley smiled.

"That just sort of laid there for a while," Juliann continued. "Then Dennis called for the

waitresses to bring champagne for a toast, which sort of distracted all the other Methodists into wondering whether they really ought to drink it or not, even though there wasn't any minister at the table. That brought a little relief. And the waitresses brought fancy glasses with stems and poured the champagne and Dennis toasted the bride and groom. Then Joe said, 'Plus, we're going to have a baby in March.' And Aura Lee said, 'We didn't see any point in prolonging the agony by putting off telling you that.'"

"That's what I thought, perhaps, that you needed to hear, Mr. Cavriani, before you made your decision," Inez Wiley said. "Something else to take into consideration, perhaps, is that the only other woman in Grantville who really has the academic preparation to provide Idelette with the level of training you want for her is Carol Koch. Her mother-in-law was left up-time. But, uh, Ron and Carol got married in December 1979 and Ronella was born in June 1980. So in a way, it's six of one and a half-dozen of the other. Not to mention that neither of them is Calvinist."

"Do you have any Calvinist female mathematicians or accountants in Grantville?" Cavriani asked.

"Not as far as I know. Not up-time trained ones. Ashley Jennings was brought up PCUSA-Presbyterian Church in the United States of America, which is real liberal—and joined the Church of Christ when she married Terence Sterling, which is probably worse than not ever being a Calvinist at all. Enoch would think so, at any rate." The wife of Grantville's Free Independent Presbyterian minister and by default universal Calvinist minister smiled.

"You observed Carol in action at the Rudolstadt Colloquy, of course," Inez continued. "Shortly after that, when Leahy Medical Center in Grantville began cooperative efforts with the medical school at Jena, the faculty there asked for someone to teach statistics. So Grantville sent them almost the only person we had available to teach statistics for a year. Someone told me that when the dean looked up and saw who their new adjunct faculty member was, he came close enough to dying of apoplexy that the cooperating medical team had to be called in."

"If Mrs. Koch is in Jena, then she would not be available as—what was the word—Idelette's mentor, would she?" Cavriani asked.

"After the end of the current semester, Carol will be working for the state government. Tony Adducci has asked her to take a job at the Department of Economic Resources. Aura Lee works for the Grantville/Ring of Fire local government, so you might want to think, too, which level of government you'd rather have Idelette studying while she is with us."

Juliann, who was still standing, looked down and interrupted Inez. "I've never had a thing against Aura Lee, mind you, since that's the question Mr. Cavriani came to get answered. I don't have a thing in common with her, but nothing against her. She must have had a dozen chances, in all those years between when Joe started going out with her and she finally married him, when she could have done something that would have broke his heart and spirit. But she never did. So I'm not going to hear anyone say a word against her."

"All those years?" Cavriani asked.

Juliann switched her gaze to him. "They were already eyeing each other before Joe went into the army after he finished his junior year. Back before Grantville had this big consolidated high school. That was 1973 and she was sixteen, then. They saw each other whenever he came back and they wrote back and forth. I know that because when he got out of the army, he had a box with five years' worth of letters from Aura Lee saved up in it. Which makes me sort of think that it would have been when he was home on leave the summer of '74 that they got to the point of 'gone fishin',' instead of just 'a wishin'.' If you take my meaning. He even managed to get leave

and come back to take her to her senior prom. That was '76; they cut it so close that Dennis picked him up at midnight after the prom itself was over to take him to Fairmont to catch the bus back and her father came later and picked her up from the after-prom party."

"Knowing that she had attended with Joe?" Inez asked.

"There ain't no flies on Willie Ray Hudson, Inez." Juliann picked up her root beer. "There wasn't nothing sneaky about it. I know they saw each other as regular as possible all the time she was at WVU. He got out of the army in '79. The army was the best deal anyone could have imagined for Joe. He came out with his high school diploma plus all sorts of certifications, including fire fighting. He was in transportation the whole time. Then he got the GI bill to take a technical course. She graduated in '80, right in time to land in the middle of the storm about her sister Debbie seeing Chad Jenkins and then getting married to Chad Jenkins. Which she ducked out on by getting a job in Charleston and not coming back to Grantville."

Juliann took another sip. "I guess you could put it this way. I don't think they got married because they were having a kid. Not a case of, 'you can't fool Mother Nature.' I think they decided that the time had come to have kids if they wanted them at all, so they got married once Mother Nature decided to pick up the option they gave her, so to speak."

It didn't take Leopold Cavriani long to sort through the implications of that rather convoluted statement. He still found the marriage customs of the up-timers somewhat confusing, as in this apparent case of fidelity precedent to matrimony for a period of nearly a decade and a half—not unique by any means, he knew—whereas others entered into formal matrimony and then dissolved it with quite dizzying speed. Not to mention the concept that in the up-time world, children had been regarded as an . . . optional . . . aspect of marital relations rather than their essential purpose.

"I've never had a thing against Aura Lee," Juliann repeated. "Especially not since they named their girl for me instead of for Vera Hudson."

Even though Juliann's voice was raspy from years of chain-smoking, the cream in it could have been skimmed, whipped, and spread on top of strawberry shortcake, Inez Wiley thought.

* * *

"You do not know of Barbarossa?" Count August von Sommersburg looked at the secretary of the treasury of the State of Thuringia-Franconia and blinked. The story of Barbarossa was well known. "Even the encyclopedias of the up-timers recall the emperor who is said to be sleeping beneath the Kyffhäuser mountain in northern Thuringia, not far from my own lands."

"I don't doubt that they do," Tony Adducci said. "I've just never happened to come across him myself. My wife Denise might have, or my sister Bernadette. They have more education than I do."

Leopold Cavriani looked at him, thinking that the man was extremely intelligent, although he had little formal education compared to several other of the SoTF officials, with only two years of what the up-timers called "college." This did not bother Leopold, since he had no university training at all, himself. The Cavrianis sent only those family members who appeared to be in need of a somewhat more sheltered life into the academic world.

Adducci, an UMWA man, had become widely respected since the Ring of Fire for his reading into economic issues—partly, as he said himself, courtesy of his librarian wife's research skills. He had run for election under the Fourth of July Party right away in 1631 and was surprised when Mike Stearns picked him for secretary of the treasury of the NUS, now the SoTF. One son in the

army, two sons still dependent upon him, and—Cavriani smiled—a daughter whose arrival two months before had bemused her parents more than a little. Baby Rosemary was twenty-one years younger than Tony, Jr.

Since the Ring of Fire, Adducci had been diligently reading up on the financial material that his wife and sister loaded on him and complaining with some humor that the Chinese word for strife was two women in the household. For three of those years, his statement that if a daughter was added, he might as well resign like the original secretary of treasury had been considered a joke by his colleagues.

"By those writers and dreamers who have had a vision of a *Germania* greater than the thousand squabbling principalities of the Holy Roman Empire," Cavriani said, "Emperor Frederick Barbarossa has been considered greater than Charlemagne in some ways. If he had not been betrayed by Henry the Lion, he might have been greater in all ways. Historians say that he died as an old man during the Third Crusade, drowned while crossing a river in Asia Minor. His body was never found."

"Then what's he doing in Thuringia?" Adducci asked.

"German folklore says that he never died at all," Cavriani answered. "That he, with his heroes, is there in the bowels of the Kyffhäuser, under the ruins of the Hohenstaufen castle. That in the hour of Germany's direst need, he will reappear in all his one-time power and glory."

"Sort of like King Arthur." Tony got up to refill their coffee cups.

"Supposedly," Count August said rather ruefully, "all of this is no idle fancy. It is said that once upon a time a peasant entered into the great cavern on the south side of the mountain and saw the emperor sleeping there in a magnificent room. He was sitting in an ivory chair at a marble table. His red beard had grown right through the table. There is another story of a piper who played for him, to entertain him during his centuries of sleep, and received a hat full of gold as a reward. Or other musicians who were rewarded with poplar branches that turned into solid gold as they walked home. About every century, it is said, a living person has been admitted into the presence of the sleeping emperor."

"Was this because he was interested in current events?" Adducci asked rather drily.

"It is said that each time he asked three questions. 'Are the ravens still flying over the mountain? Are the dead trees still overhanging the cliff ? Has the old woman awakened ?' Each time, the visitor answered, 'Yes, Yes, and No.' Each time, Barbarossa replied, "Then I shall have to sleep another hundred years."

"What did each question mean?"

"The ravens led him to battle. So if they were still at his mountain, there was no battle he needed to fight. The dead trees would blossom when it was time for him to come forth. Those who study the lore of the ancients believe that the old woman was the giant druidess who confronted Drusus and prophesied that the Romans would come to disaster, who was too old to follow Widukind's retreat, so he buried her under a pile of stones with the words, 'She will come back.' Come back to prophesy disaster to the enemies of the Germans, of course."

"I think I've got it," Tony Adducci said. "Frederick Barbarossa is for you guys here in Thuringia what Jock Yablonski was for us in the United Mine Workers back in West Virginia."

Count August blinked in turn.

"Here," Tony said. "Let me tell you about Jock."

He'd tell him about Jock, Tony thought to himself. He just wished that he didn't have to tell

him about Tony Boyle at the same time. Sommersburg had found that history of the Pendergast Machine in Kansas City that Melissa Mailey stuck into the books designed to teach him about the American political system a lot too inspirational already.

"His name was Jablonski, really, but he spelled it with a 'Y' so people wouldn't pronounce it wrong. Joseph Jablonski. Jock Yablonski."

* * *

Tony got up. He talked better when he was standing up, walking back and forth. "Jock was born in Pittsburgh—that was in Pennsylvania, the state just north of West Virginia. As far as geography went, it was all part of the Appalachian highlands, all part of the great coal fields. He went into the mines as a boy. His father was killed in a mine explosion. He moved up through the business side of the union. When he was only twenty-four years old, he was elected to represent fifteen thousand miners on District Five's executive board. That board made union policy. He was active in UMWA politics for nearly forty years. John L. Lewis, the greatest of the UMWA presidents, called him his right-hand man. Lewis said, 'Whenever I have trouble in the coal fields, I need him.'"

"John L. Lewis?" Cavriani asked.

"You can find him in all the encyclopedias if you look. He was famous," Tony shrugged off the interruption. "There wasn't any real democracy in electing the UMWA presidents. When Lewis died, an old man, one of the vice-presidents, stepped into the office, and he appointed Tony Boyle as vice-president, who succeeded in turn. Boyle was no militant—didn't confront the owners on safety issues, for example. He actually opposed the extension of benefits for black lung disease—coal miners' pneumoconiosis—by the Pennsylvania legislature, and was furious when Yablonski went over his head to get it passed. Called it insubordination. Boyle was also a manipulator—turned the districts into trusteeships, which meant that the membership wouldn't be allowed to vote for their district officers any more. He'd appoint them."

"I take it," Count August said, "that democracy was not universally appreciated up-time. Not even in your West Virginia."

Tony Adducci smiled grimly "You take it right. It's funny in a way. Just like you have your Barbarossa right here in Thuringia, the crisis in the conflict between Boyle and Yablonski came to a head right near Grantville. You've maybe heard people singing the song about the 'Mannington Mine Disaster.' It was at Farmington, right beyond the border of the Ring of Fire, heading east past the high school. There was a big explosion in Consolidation Coal Company's number-nine mine. Ninety-nine miners were inside; only thirteen managed to escape right away. They got eight more out later. That left the rest of them to die underground. Seventy-eight men."

He continued to pace. "It was a disaster, but it wasn't a surprise. Safety people had known for a long time that cold weather increased the danger of methane. But there weren't any special warnings; they didn't follow the federal safety regulations, either. Boyle didn't show up until more than two days later. All dressed up, with a rose in his lapel. He didn't say anything about the safety violations; he didn't speak with the families of the victims; just went back to his office in Washington, D.C. Even praised Consolidation. After fifteen more explosions, the company sealed off the mine to cut the fires off. With the men still down there."

"This, I take it, was not a popular move," Cavriani commented.

"According to Jock's son Ken, Jock said, 'But that sonovabitch Boyle. With those people dead in the mine, how could that bastard stand up and praise the company's safety record the way he did?' And Jock decided run against Boyle in the next election."

Adducci slammed his fist down on the table. "Boyle had control of the machine. Jock lost. But Tony wasn't satisfied with that. He set some goons from District Nineteen to get rid of Jock. Three months later, about, Ken wondered why his father hadn't shown up for the Inauguration Day events. He went to the house and found his father dead. And his mother and sister. Brutal. Jock had five gun shells pumped into him; his wife Margaret two; his daughter Charlotte two. They were shot in their beds. Blood all over their beds."

"Somehow," Count August commented, "most of your books about American politics do not seem to include episodes such as this."

"Of course they gloss over them, especially the school texts. That's why it's up to us to remember. What's that quote? 'People who don't know history are doomed to repeat it.' In short, then," Tony Adducci summed up, "Jock Yablonski led the fight against corruption in the UMWA. He fought against Tony Boyle and his machine. He didn't go away just because he was dead. A couple of months after he was murdered, people organized the Miners for Democracy. It tried to accomplish reform from inside the organization. Also worked to improve mine safety conditions. To get better health benefits for all miners.

"Three years later, a federal judge overturned Boyle's election on the grounds of massive vote fraud. The court ordered a new election. MFD ran a slate and won. It wasn't all over like magic, then. There was vote fraud again in District Thirty-One a year later. It was five years before Boyle was convicted of arranging the murders. As they say, 'Eternal vigilance is the price of liberty.'"

"It is," Count August said, "a truly magnificent mythos. Worthy indeed of comparison with Barbarossa. I had not realized that you had such."

"Myth?" Tony was shocked. "I was eight years old when Boyle's thugs shot Jock Yablonski. My daddy had taken me to lots of his rallies." He reached out across the table, extending his arm and turning his hand upwards so that the count could see his palm. "I've shaken his hand. There's a snapshot at home, somewhere, showing me doing it. I was just a little kid, four or five years old, maybe. But I shook Jock Yablonski's hand myself."

He got up. "Dad's here in town. He's not in very good shape, but if you're willing to come and listen to him, he'll spin you yarns about Jock Yablonski for hours."

* * *

"Arch Moore's problem," Horace Bolender said, "was that in his last term, after 1985, he got so greedy that he didn't stay bought. He'd take a bribe from one party; then go out and take a bigger one from someone else. Now that was corruption for you—more than would fly even in West Virginia state politics. Gaston Caperton beat him in 1988. Gerry Simmons worked on Caperton's campaign. If you look at his kids, the first one was born that year and they named him Gaston C. Then the other two boys are Jay and Bobby, for Jay Rockefeller and Robert Byrd. Big time Democrats politically, those Simmonses, most of them."

"Ah," Marcus von Drachhausen asked, "what was the final disposition of this governor's corruption?"

"He was prosecuted and sentenced to five years in prison in 1990. If he'd been content with what he collected from 1969 to 1977, he'd have got away scot free. There's a lesson in that. 'Don't let your reach exceed your grasp or what's a prison for,' to misquote somebody."

"It didn't hurt Shelley, though," Norman Bell pointed out.

"Shelley?" Drachhausen raised his eyebrows.

"Arch's daughter, Shelley Capito, that's her married name. She got elected to the United States House of Representatives five years after Arch went to prison. That would have been ten years before the Ring of Fire happened. It was a political family, after all. Arch served in the House himself. You can't keep them down for long."

Drachhausen understood how that worked completely. He was, after all, married to Louisa, the elder daughter of Count August von Sommersburg. The von Sommersburg line had not survived in Thuringian politics for almost four hundred years by allowing occasional setbacks to get them down.

"One of the U.S. attorneys who prosecuted Arch came out and made some mealy-mouthed statements. Stuff like, 'Throughout the history of man, government officials have strayed from the straight and narrow. Other states have had a history in the past of having very serious corruption problems.'"

"Haw, ain't that the truth, though," Daniel Cunningham said. "Compared to New Jersey, West Virginia smelled a lot like a rose. Though, of course, Wally Barron—he was governor back in the early sixties—ended up in prison for corruption, too. Though it took the nice Nellies ten years and he eventually went down for jury tampering connected with the trials in which he was acquitted."

"The fact is, though," Bolender pointed out, "that there was just about always some do-gooder chasing down people and putting them on trial. That's one of the hazards of doing politics American-style, Drachhausen. I used to keep a scorecard. Between 1984 and 1993, the U.S. attorney's office convicted nearly a hundred state and local officials. That included five people pretty high up in the governor's office and four members of the state legislature. Nine sheriffs, thirteen deputy sheriffs. Several lobbyists or staffers. Busy little beavers, those federal prosecutors."

"The immediate problem," Bell pointed out, "is that your boss, and Marcus' boss here"—he pointed to Drachhausen—is one of those do-gooder types. Personally, I think we're going to have to keep an eye on Tony Adducci. Or he's going to be racketing around yelling about rigging of state purchasing contracts. Or about taking bribes from big companies." He threw a significant look at Drachhausen. "If they can't get you for what you actually did, they'll get you for extortion, mail fraud, obstruction of justice, or tax evasion. If we all tried to run a railroad their way, nothing would ever get done."

Bolender shook his head. "The fact remains, Arch took twenty-five thousand dollars as a political contribution on the understanding that the contributor would get a bank charter, but the corporation never got it. That's just not honest. The least you can do, when you take a bribe, is deliver the goods. Especially when you're putting on the pressure and saying that if you don't get the bribe, you'll see to it that the charter or whatever never makes it through the normal channels. It was that second part that let them get him on extortion."

"What I find most unnerving," Marcus von Drachhausen said to Bell in private after the meeting, "is not that your officials were corruptible but that, ultimately, your prosecutors indicted them and your juries convicted them."

"Hell, Marcus," Norman said. "Nobody ever claimed that it's a perfect world. You do your part. Keep an eye on Adducci for us. We'll do our part.

* * *

"Part of the problem, of course," August von Sommersburg said, "is that the county itself will become extinct at my death. As Gleichen did with the death of the last count, which has posed so

many interesting administrative and legal problems for the administration of Thuringia."

"But you have daughters," Tony Adducci protested. "One thing that I do know is that back early on, when we were still the NUS rather than the SoTF, Congress changed the law so that daughters can inherit equal with sons. You were in the House of Lords then, what's the Senate now. You voted for it yourself."

"Louisa and Elena can now inherit my property. They cannot inherit my title and jurisdiction. There is a distinction."

"Well, why not?"

Count August looked a little abashed—an expression that did not sit well on the face of a man who normally resembled a portrait entitled "Colonel Sanders of Kentucky Fried Chicken as a Pirate."

"I was a second son. While primogeniture does not generally prevail in the Germanies as it does in England, nonetheless there is a limit to how often a small principality can be subdivided and still support its rulers. When my father died in 1603, my older brother was already married to a woman of equal birth and had two sons. He and his wife were young and healthy. I had become very fond of one of my mother's ladies-in-waiting. A noblewoman, of course, but of the lower nobility. Not of equal birth. I bargained with my brother. If he would consent to a morganatic marriage for me, I would, naturally, not have children with inheritance claims. It was done. I married in 1603. All seemed well. My brother and his wife had two more sons before his death in 1607. But all four died as children, the last of them in 1608, just a year after his death. So I became count and count I still am. But my daughters cannot become reigning countesses; they do not hold the rank."

"Your wife has been dead for years. Why didn't you remarry?"

Count August provided him an explicit, not to say somewhat embarrassing, explanation of the medical problems that, occurring as a result of advancing age, made it impossible for him to contract a canonically valid second marriage and rendered such an attempt at marriage futile for the purpose of producing heirs in any case.

Count August didn't seem to find it embarrassing at all.

It occurred to Tony that any number of Grantville men with whose wives the count had flirted unashamedly over the past three years would be most relieved to hear it. Not, of course, that he would ever violate a confidence. On the other hand, this wasn't the confessional. Perhaps just a hint, in a couple of cases, wouldn't come amiss.

Count August, however, was proceeding onward to other thoughts. Primarily those associated with his disappointment in his son-in-law, Marcus von Drachhausen. The man was turning out to be, as time went on, not to mention as the military successes of Gustavus Adolphus went on, too Saxon in his allegiance for Count August's tastes. Given the nature of the divorce laws that prevailed within the Ring of Fire, and that the laws of the Ring of Fire did not automatically assume that a wife's domicile was that of her husband, might it be possible for his elder daughter Louisa to shed this encumbrance and retain custody of their three children?

"I know that I used my position as senator to get him appointed as your deputy in the first place," the count said rather apologetically. "But I really did not have many options two years ago. Now, however, if I can arrange a divorce for Louisa once the child she is currently expecting has been delivered . . . If we get rid of him, then so can you."

"Might your daughter not object to this?"

"I can't imagine why. He's closer to my age than he is to hers, not to mention that he is often personally unpleasant. We had to accept him in order to placate Saxony in the matter of a border dispute—a lawsuit that went bad, unfortunately. If she comes to Grantville to receive its superior medical services during her delivery—why, I really do not see any pressing reason that she should leave again."

Tony advised him to consult a lawyer. Preferably two lawyers, one up-time and one down-time. He mentioned in passing that Laura Koudsi had just opened a suitable practice. Not that he would ever resort to steering, but Laura and her family were also parishioners at St. Mary's.

* * *

"Why don't you meet with both of them?" Inez Wiley suggested. "Together. I called Ron Koch and Carol has come to town for a meeting with Tony Adducci. That might give you a better idea. I'll see both of them at the League of Women Voters this noon, I'm sure. Carol would never miss it when she's here. Lunch is about the only time that working women can get together, so we keep the meetings short and snappy."

Cavriani nodded. "That might be best."

"May I make a suggestion?" Inez asked.

"Since this will profoundly affect a girl whom you have agreed to foster in your home, most certainly."

"Bring Idelette along. So you can see whether she hits it off better with one of them than the other."

* * *

The people who hit it off were Carol Koch and Aura Lee Stull. They had seen one another at meetings before, but their paths had not really crossed previously. While Cavriani, Inez, and Idelette watched with fascination, they sank deeply into shop talk, digressed into the fact that they both missed jogging even though it really wasn't necessary in a world where most people walked everywhere they went, and then meandered into children.

Although they were only two years apart in age, with Carol actually the younger, her children were several years older, so she started discussing opportunities for higher education, down-time apprenticeship possibilities, and similar matters that were clearly of enthralling interest to both women. After which they went back to shop talk and provided an entertaining version of what each knew about the adventures of the three draconian lady auditors who had taken on Franconia and triumphed over it, more or less.

"I have been lonely, a little," Carol was saying. "Almost all my friends were over in Fairmont, in the church there, and clubs. Or wives of men we knew through Ron's work, though those were more acquaintances. Pleasant to see, now and then, but not really friends. We hadn't had our house in the country here very long before the Ring of Fire and I'd never really had any reason to come west, over to Grantville. The only thing that kept me sane, that first year, was that Ron is really my best friend and always has been, ever since we met."

That led to a discussion of their meeting while she was an exchange student in Germany, the fact that they had known right away, "um, about ten minutes later," that they really must marry each other just as fast as they could persuade their respective families that it was a good idea, the negotiations with the families that took quite some time since they thought that this decision was too impulsive to be wise, and the like.

Aura Lee reciprocated with her own confidences. Her friends, too, had been in Fairmont. At

the time of the Ring of Fire, they had only recently purchased a house on the far eastern edge of the territory included in it. "It's near the Edgertons," she said. "In fact, it was Ardelle Edgerton who told us it was on the market. It's been interesting, I suppose, but overall, I wish now that we'd stayed in Fairmont."

She paused. "Except, of course, that Joe has done so well here. This time suits him. He has a real career, not just a job. Not that he wasn't doing fine up-time. Joe's fifteen years younger than Tom, you know—that's Harlan's father, Tom and his wife were left up-time—and thirteen years younger than Dennis. Far from a spoiled youngest. That's not really irrelevant. He went into the army in 1973. Missed the fighting in Viet Nam. Spent his whole time in transportation and then went to work for the state highway department when he got out in 1979 and finished his technical course. Joe's not the . . . smoothest . . . guy in the world. His edges have filed down quite a bit over the fifteen years since we got married, just maturing, but . . . when I got out of college—that's nearly twenty-five years ago now—he certainly wasn't what my folks, especially not my mother, would have preferred for me. Much less five or six years before that, when we started dating."

"Family problems?" Carol asked sympathetically.

"I wasn't going to sneak around the fact that I liked Joe a lot better than I liked any other guy. We wrote. Perfectly harmless letters, once a week. Spring of my junior year in high school, he'd written back in October about a racial problem that had broken out in the barracks in Louisiana. I was taking American Government, and I asked him if I could use the letters as part of a class presentation on the general topic of race relations in the armed forces. He said that was fine, so I did. There wasn't anything embarrassing in our letters—I took those two to class and used them as one of the exhibits. The teacher actually called Pop and asked him if he knew that Joe and I wrote to each other. When Pop said that yes, he knew, and the letters went out on Monday morning as regular as clockwork, that sort of took the excitement out of it for everybody else, I think."

After some time, Inez cleared her throat and suggested that they really ought to come to the topic of the meeting, which was the training of Idelette.

Leopold Cavriani smiled. "Tweedledum and Tweedledee went forth to fight a battle," he said.

Inez looked at him with some confusion.

"Papa has come to love your nonsense rhymes," Idelette told her solemnly. "I think he means that Mrs. Koch and Mrs. Stull are very alike. Such as both of the Tweedles had a common interest in the rattle. I do not think he means that they are likely to battle. Are Mrs. Fodor or Mrs. McIntire or Mrs. Utt back in Grantville yet?"

"No," Aura Lee said. "All three of them are still in Franconia."

"I would like to mentor, or be mentored if that is how it is said, with one of them," Idelette said. "It seems that their lives are more interesting than learning to be an accountant here in Grantville."

Leopold looked at her and said, "No." Quite simply, "No."

"I had a fight in an alley in Jena at the end of the Rudolstadt Colloquy," Carol offered helpfully. "The police actually put me in jail. Ed Piazza had to bail me out."

Idelette looked at Mrs. Koch with distinctly increased interest.

"Carol will be starting a new job," Aura Lee said. "I already have one trainee, so it would be less stressful for me to take a second than for Carol to try to mentor Idelette while she is starting a

new job. Plus, she's pretty well finished dealing with teenagers and I have one who's fifteen and one who's twelve, so I'm still in the middle of it."

Carol looked at her gratefully. "Of course, that doesn't say that Idelette couldn't come over to the SoTF administration building occasionally, if something out of the ordinary is going on. Plus, I do have experience in mathematics tutoring, if she needs more work in theory."

Cavriani had a strange feeling that the decision had been taken out of his hands. And he wasn't even sure how.

This was not a common experience for him.

He was, at least, sure by now that either of these women, or both of them, would make a suitable "role model" for Idelette. He thought of one of the strange, wailing songs that Ed Piazza's wife Annabelle was accustomed to play on the mechanical music reproduction system in their home, the "stereo," about a "one man woman." These two, though, were each securely in possession of the husband she wanted rather than mourning for "the man who got away." He had no further qualms in regard to, as Mrs. Wiley had put it to the elder Mrs. Stull, "morals; ethics."

Not, in either case, a conventional role model. But then, by bringing Idelette to Grantville, he had determined already that her life would not be the conventional one of the daughter of an Italian merchant from Geneva.

* * *

"I do advise you, from a professional standpoint, that in the long run you will do better if you have somewhat less sticky fingers. As long as you are doing business in the SoTF. Specifically as long as you are doing business in the immediate region of Grantville itself. There are certainly a more than sufficient number of perfectly legitimate opportunities for making a profit. Such as the sale of gravel and concrete to the government at a reasonable price, without bribery to obtain the contract. If you are underbid, look elsewhere to make your sales. Presuming that you have presented an honest estimate, the contractor who underbid you will shortly be bankrupt and you will be able to obtain the contract the next time the state issues a request for proposals."

August von Sommersburg looked at his consultant. Facilitator.

Cavriani looked back. The Genevan was clearly unimpressed by the fact that he was addressing a member of the higher nobility of the Holy Roman Empire. Or, these days, of the United States of Europe. The hereditary head of the county of Sommersburg within the SoTF, at any rate.

"Owing to the fact," Cavriani continued, "that people like Adducci appear to have little patience with some of the scams currently under way in which certain individuals are tempting you to participate. It is also my impression that Mrs. Stull's husband, the secretary of transportation, has minimal tolerance for manipulation and rigging. Just because you have ascertained from statements made by your son-in-law that corruption was far from unknown in that up-time world does not mean that it would be prudent for you to engage in it here. As I read in the report that Marcus von Drachhausen provided to you concerning his conversation with Horace Bolender and his associates, those convicted and imprisoned in West Virginia included several legislators. They will not consider you immune because you are a senator."

"I will take your advice under consideration," Count August said rather mildly.

"Specifically," Cavriani concluded, "it is my impression that the project being floated for the construction of a baseball stadium in the Grantville-Rudolstadt-Saalfeld 'metro corridor' is something that the lovely up-time stories define as a 'tarbaby.'"

Count August fingered his beard. "In the meantime, I wish you well on your journey to the Upper Palatinate."

* * *

"So your assignment, should you choose to accept it . . ." Tony Adducci grinned at Carol Koch.

"Is to burrow into the Department of Economic Resources and get the goods on Horace Bolender at this end, while the auditors you have in the field get it in Franconia."

"I've specifically sent Noelle Murphy off to Franconia in the company of a couple of down-timers to see what she can turn up there. I told her to concentrate on the bid-rigging specifically rather than doing general auditing the way the gals have to. It's almost amusing that we have the cloak-and-dagger business stashed away in Economic Resources, right under Horace's own nose."

"I have to admit," Carol said, that I'm a little surprised to find out what family she belongs to. No one would dream that Noelle and that oaf Keenan Murphy who hangs around the 250 Club came from the same parents."

"They didn't," Tony said, almost a little reluctantly. He always felt a little bit like he was betraying the home team when he had to put one of Grantville's generally known but not officially public pieces of history into words for people like the Kochs who had not really been a part of the town before the Ring of Fire.

"Noelle's officially a Murphy, but Francis and Pat—you may have met Pat; she works for the sanitary commission—had been separated for a couple of years when Noelle was born. Pat took the three girls right after Patty was born and moved to Fairmont. She'd had it up to here with Francis' drinking. He came in thoroughly soused one Friday, four hours after he'd gotten off work, picked Patty up, and dropped her." Tony was uncomfortable. The episode of the Murphy separation had not been one of the high points of the history of St. Vincent de Paul parish in Grantville, the way it had been handled.

But he went on. "Keenan was a handful, even then. Now they would call it hyperactive, I guess. ADHD or something. He stayed with Francis' parents here in Grantville, but Paul and Maggie never could handle him. Never could control him."

"Oh," Carol said.

Tony chewed on his mustache a minute. "That was, I guess, about three years before Denise and I got married. Everyone at St. Vincent's was talking about it. Old Father O'Malley preached a homily about it, trying to shame Pat. Talk about a pre-Vatican-Two priest. Her parents walked out of mass. Anyway, Francis and Pat haven't lived with each other for twenty-five years, even though they're still legally married. Not divorced. Irish Catholic families, not Italian Catholic families—bunch of uptight Puritans, if you ask me. My wife Denise excepted, of course. She's Pat's cousin. Pat got Noelle baptized over in Fairmont. Denise and I are her godparents, so I feel some extra responsibility for shipping her off somewhere potentially dangerous."

"Nice men!" Carol said. "If they had their way, the women in their families would spend their lives neatly wrapped in cellophane, padded with cotton batting, and securely locked in a bank vault to make sure that no harm would come to them." Her tone was rather tart.

Tony looked at his new recruit a little dubiously. It was sometimes a bit hard to follow her train of thought. But he went on. "Pat only moved back to Grantville three or four years before the Ring of Fire, looking for someplace cheaper to live because Noelle wanted to go to college.

Something had to give, money-wise. The three older girls were on their own by then. They didn't come through the Ring of Fire; they were living in Fairmont."

"I'll take the job on," Carol said. "Starting as soon as the semester is over in Jena. Even if I don't come up with any indictable dirt for you, Economic Resources has enough on its platter that they can keep me gainfully employed and I'll be earning my salary fair and square. But I'm going to have to ask around. Put some questions here and there. Not being a native of Grantville, I don't really know where all the bodies are buried and which closets have skeletons that rattle."

Tony nodded agreement. "Just be discreet."

* * *

"How close is Elaine Bolender who's the head of the state library to Horace Bolender and that bunch? Carol Koch asked. "You know, she's married to Albert Wilson, but she's gone back to using her maiden name since the Ring of Fire."

"Let me think. She's Pam Bolender's sister." Aura Lee started working her way through the complex web of Grantville relationships. "They're Dick Bolender's daughters. Dick and Jim are brothers, so they're first cousins."

Idelette sat listening, drinking a root beer and absorbing the things that she would need to know to meet the expectations that her father had for her when he brought her to this town.

"Elaine's married to Albert Wilson. Before the Ring of Fire, he taught industrial arts at the high school in Fairmont; he's been up at the oil field in Wietze now for almost two years, in the military. He was a veteran. Pam's married to Lowry Eckerlin, Lowry Junior. He's down in Franconia, doing law enforcement."

"Elaine and Pam aren't as close personally to Horace and Laura Jo as you might think, though, for first cousins," Inez Wiley inserted into the conversation. "Oveta and Mildred, Dick and Jim's wives, have always sort of rubbed each other the wrong way. Mildred's a Jenkins—some kind of cousin of Chad Jenkins' father. You've probably met Chad."

Carol nodded her head, glancing at Aura Lee. The expression of mild distaste on her face was quickly replaced by one of controlled neutrality.

One more thing that Aura Lee and Carol have in common, Inez thought. It was amazing how many women didn't particularly like Chad Jenkins. Well, perhaps not amazing. A lot of women, especially those who were securely attached to someone else, were annoyed by a man who was always more or less testing the waters. Not with serious intent, but just automatically taking their temperature.

What Inez said aloud was, "Oveta's a Sanderlin. They're from Marion County, but not from right around here. They didn't move to Grantville until the Depression."

Of course, Carol thought to herself. They've only been "right around here" for seventy-five years or so. I wonder how Inez classifies the Kochs. I'll have to ask Aura Lee when we're talking *tete-a-tete* some time.

What she said was, "In that case, I think that I will ask Elaine some questions in regard to Laura Jo Cunningham. Horace Bolender's sister, that is, who is the executive secretary of the Grantville Research Center. I haven't been on the job very long, but it seems to me that almost every new economic development proposal that comes along has gone through the research center at some point. It's often their researchers who put the actual paperwork together on behalf of the would-be investors. Somebody is feeding inside information to Horace Bolender before the proposals come up before the board. In a lot of cases, people I think are fronts for him are

managing to tie up just one little thing that's crucial for each proposal before the boards ever consider them. Which means that once they are approved, he has leverage to get himself in on the ground level to take some shares or it can't go forward."

* * *

Carol sat in the back of the room, trying to look as inconspicuous as possible. There was to be a joint hearing. The Schwarza-Saalfeld Enterprise District, for tax implications of the project. The Grantville Development Authority, for funding of the proposal. Both of them to consider the zoning aspects. She was representing Tony Adducci, who was ex-officio a member of both. As such, she would not be expected to say anything. Just to observe. In fact, Tony hoped that the mere fact that he had sent her rather than coming himself would send a signal that this was a low priority item as far as he was concerned. Not worth his personal attention. Useful as a training exercise for a new hire with little experience or expertise in the field.

Similarly, Henry Dreeson was not there. Michelle Mastroianni, his clerk, was.

The administrations of the SoTF and Grantville hoped that this apparent inattention would tempt the investors to become incautious.

She looked around. Marcus von Drachhausen was here. Interesting. He was certainly not here in his capacity as Tony's deputy. If he was representing Count August, his father-in-law, that would constitute a conflict of interest. Neither Horace Bolender nor his sister Laura Jo Cunningham. However, next to Drachhausen, Beverly Kay Cunningham, who was in charge of the resources overview section of the Grantville Research Center which Laura Jo ran. And who was married to Delton Cunningham, in Grantville's Streets and Roads Department. And Delton and Laura Jo's husband Daniel were brothers.

The members of the two boards overlapped quite a bit. A batch of them, naturally enough, were real estate types. Bunny Lamb was the chairperson.

Carol thought irreverently that any woman whose nickname was Bunny must have been passionately in love to marry a man named Lamb.

Huddy Colburn and Thurman Jennings, the other two important real estate agents.

Then the wheeler-dealers who always managed to deal themselves in on this kind of thing, she thought cynically, even if serving on committees and boards caused them some actual work. Keith Trumble, Chad Jenkins, Hugh Lowe.

Edgar Zanewicz, the vice president of the bank. Mary Ruth Caldwell, secretary to the Authority and also Thurman Jennings' daughter. She was bearing up well after the terrible injury her husband had suffered early the previous winter.

The baseball stadium proposal, with all its associated implications for rerouting of roads and traffic, was on the floor. Carol took meticulous notes.

* * *

Count August von Sommersburg did not appear at the hearing in regard to the baseball stadium proposal. Indeed, on that very morning, he and his unmarried daughter Elena were running completely unrelated errands at the SoTF administration building.

Starting in Ed Piazza's office, they left vases of fresh flowers everywhere they went. To greet the coming of spring, the count said gallantly, as he flirted with the staff, pointing out to them as he bowed that they were so essential to the smooth operation of the government, but alas so often underappreciated.

Liz Carstairs giggled. Her husband was one of those to whom Tony Adducci had passed a

comforting word about the count's unfortunate medical problems. From across the room, Mary Kathryn Riddle, just married in February to Derek Utt who was over in Fulda, winked at her. Megan Trumble, as befitted a recent widow, was subdued, but Mallory Pierpoint flirted back without the least sense of shame.

Jamie Lee Swisher and Tanya Newcomb, who had been deemed too young and innocent to be clued in about what was going on by the others, just looked at the tableau in some confusion.

The "guys" on the President's immediate staff, who were all down-timers, sat transfixed by the count's daughter. Elena von Sommersburg was a truly bodacious twenty-two-year-old redhead. As Tony Adducci had said to Howard Carstairs, if the count's late wife had looked anything like that, a fellow could see why he had opted to marry a girl who wasn't *standesgemaess*.

* * *

Aura Lee Hudson looked up. Idelette Cavriani was peeking around the door. She smiled.

"Can we come in?"

"Sure," Aura Lee said, "but who is the rest of 'we'?"

"This is Annalise Richter. Do you know her? She is the granddaughter of Mayor Dreeson's wife and she is running the St. Veronica's schools this summer while her grandmother is away."

Idelette paused. She was beginning to learn how to swim in the fluid currents of Grantville's various Protestant denominations with their fluctuating boundaries, matrimonial conversions, and overlapping theologies, so different from Geneva. When she met Annalise, she had at first been a little cautious, fearing that Mrs. Wiley might disapprove of friendship with a Catholic as beyond the acceptable limits. However, Mrs. Wiley had pointed out that Annalise was also the step-granddaughter of Henry Dreeson, the mayor, who was a member of their own church. Relieved, if even more confused, Idelette had been happy to have a new friend.

Now she asked, "Do you have time to help us?"

A half hour later, Aura Lee looked at them. "I do not believe this! Do you mean to say that she just dumped all of this on your shoulders and took off?"

Annalise nodded. "My grandmother showed great confidence in me. And told me not to bother the mayor unless I had to because he is a very busy man. And most of it is truly all right. The part that they call policy decisions. In that, I try to think what would be best and then do it. But for all this . . ." She gestured to the piles of papers spread out on Aura Lee's desk.

"I agree. You need some help. Yes, I will approve that as part of Idelette's training; she can assist you with the business end of running your grandmother's schools this summer."

She thought that it was not every girl who would jump with delight and clap her hands at the prospect of taking on what was going to amount to several long evenings of extra bookkeeping per week, but Idelette did.

Carol, that evening, mother of children who were older than Aura Lee's, asked a meaningful question. "Are you really sure that two heads are better than one when both of the heads are seventeen years old?"

"Not really. But I am sure that Annalise probably needs some mentoring as much as Idelette does. Maybe even more. Idelette has Inez at home, at least. Annalise is trying to be a house mother, too."

* * *

Aura Lee and Carol decided that the girls were in need of mentoring in a lot more areas than just accounting, mathematics, and business procedures. Especially Idelette before she was tossed into the wilderness of a coeducational high school the next fall. Annalise at least had some experience at that. They started having regular dinners with talk once a week at Carol's.

"Now Annalise," Carol said, "is sort of immunized. That is, she's persuaded herself that she is deathlessly in love with Heinrich Schmidt. Since Major Schmidt, the possibly idealized object of her affections, is safely immured at the siege of Amsterdam, she can fantasize about him all she likes without coming to any harm and it gives her a socially acceptable excuse to fend off other advances."

Annalise did not take particularly well to this description of an infatuation that she had, with the assistance of innumerable Harlequin Romances, pumped up in her own mind to the status of an immortal love affair.

"You, on the other hand," Aura Lee said, pointing to Idelette, "are seventeen, currently unattached, and totally inexperienced at sorting out the nice guys from the jerks. Which means that you have a lot to learn between now and the end of August. And you either learn it or, I swear, I will home school you myself."

Carol giggled.

"I'm not joking, Carol," Aura Lee said a little impatiently. "You at least got engaged to Ron before you started sleeping with him. Even though you were too much of an innocent to get birth control first."

"But we didn't intend to . . ."

"Self-delusion. 'Nice girls don't and I'm a nice girl so I won't.' Can you look me in the face and say the real words. Not 'We didn't intend to' but 'I honestly didn't expect that we would'?"

Carol chewed on that one a while. "No," she finally said. "Of course, I didn't have any real experience in holding it off before we got engaged."

"How come?" Aura Lee asked.

"Because we got engaged two weeks after we met," Carol admitted. "And that was official, after we'd told our families. Ron actually proposed the night we met each other. About ten minutes after we met each other."

This time Aura Lee giggled. "How long were you engaged?"

"Not as long as we expected to be," Carol admitted. "About half as long as we expected to be. Because of Ronella. We were supposed to be engaged for a year after Ron finished all the paperwork for coming over to the U.S., because our families thought we should get to know one another better before we married. Because of the 'how to establish a lasting marriage' procedures manuals. The ones that urge you to get to know one another gradually if you want your marriage to last."

"You decided to marry on ten minutes notice and then you *expected* to arrive at your wedding night a virgin a year later? Honestly."

"I suppose I might have," Carol said, "If Ron had stayed in Germany and I'd stayed in America. But they did want us to get to know one another better. I was afraid that if my parents knew when he was coming, they'd come along to the airport and everything would be all stiff and miserable and uncomfortable. So when it was all done and he got his ticket, I didn't tell them. And I did know his arrival date far enough in advance that I could have gone down to the clinic and gotten the pill, but you're right. I didn't want to admit to myself what was likely to come next.

The day his plane came in, I just drove to meet him all alone. And when I told him that they didn't know exactly when he would be getting in, he gave me this sideways look and said, 'In that case, I think that I am very jet-lagged and need a night to recover.' So we turned in at the first motel we saw. And when we got to the point, we sure intended to."

Aura Lee waggled her fingers at Annalise and Idelette. "Do you see what I'm getting at?"

Idelette nodded solemnly. Annalise looked out the window, studiously ignoring the conversation.

Aura Lee sighed. "Pay attention, Annalise. I was exactly your age the first time Joe and I did it together. In the back of his brother Dennis' pickup. Joe made it as nice as he could, hosed it out and everything, but it was still the back of a pickup with a camper top on it, smelling a little of oil and gas and the stuff Dennis hauled around in it. With two vinyl-covered lawn chair mattresses for padding. And since we planned ahead, we did remember about condoms."

Both girls just stared at her.

"That's what I mean about learning to sort out the good guys from the jerks first. Even so, I don't suppose there's a normal girl in the world who doesn't wonder what next. 'Just call me angel of the morning' and all that. The song was new back then. But Joe took me for burgers afterwards and sat with me with my friends instead of brushing me off as a fallen woman, someone to be scorned. And that evening, at the youth group activity at First Methodist, when we were supposed to present our private prayers, I sat there with my hands folded, thanked God that He'd let me do it with Joe, and prayed that He'd let us do it again."

Aura Lee lifted her head and smiled. "Not exactly what the minister would have wished in the way of a prayer, I imagine, if he'd had any idea."

Idelette sat there. She had a feeling that she was indeed learning a great deal in Grantville. Possibly not entirely what her father had expected.

"The point is," Aura Lee said sternly, "that you're not to let yourself be pawed by some over-sexed young klutz. Not one who will 'brush your cheek in the morning and then leave you.' The trick is to pick one you really like and who'll be inclined to hang around for the next thirty or forty years before you do anything you can't take back. And in the absence of reliable birth control in this day and age, keep your legs crossed until you're absolutely sure. If you're not sure, bring him around and Carol and I will take a look at him for you. If he won't come, classify him as a jerk."

Certainly, Idelette thought, this was not what her mother back home in Geneva expected when Papa assured her that her oldest daughter would be residing in the household of the Calvinist minister and his wife. It was far more enlightening.

* * *

Juliann Stull died on July 13, 1634. The visitation was scheduled for the afternoon of the next day, with the funeral to follow from Central.

Dennis made it from Erfurt; he was standing by the entrance, directing people to where they could sign the guest book.

Harlan was still over in Fulda, of course. No way he could get here for the funeral. His wife Eden was here with her parents, Nat and Twila Davis. Twila was watching the baby, just born the end of May. Joe and Aura Lee were over at the casket. Their Juliann was chasing after Eden's two-year-old, who was running around the way kids did, even at visitations for dead great-grandmothers. Especially at visitations, sometimes. Billy Lee was in a corner, dressed up, looking

uncomfortable.

An awful lot of people were here, Dennis thought, looking at the pages of signatures. Not many of his mother's friends. She'd outlived most of her own friends. Mostly people who knew him, or Joe, or Harlan from business. Paying their respects to the family, really, not to the deceased.

Count August von Sommersburg, for example—he had almost certainly never even met their mother. But as a senator of the State of Thuringia-Franconia he had come to the visitation because she had been the mother of a cabinet minister and of the civilian head of military procurement for the state, the grandmother of the UMWA delegate in the administration at Fulda. Come early and stayed, mingling with others who came, using the event as one more chance to network.

Dennis stood there, feeling old himself. If they hadn't been brought to this time and place, he would have been old enough to take his early social security this year. Joe was thirteen years younger. Joe had been one of those unexpected kids and because of the way things worked out, had pretty much brought himself up.

He might have done it—taken social security early and gone to Florida or Arizona. Someplace warm. Instead of running a procurement operation in Erfurt, first for the NUS and now for the SoTF with several dozen people working for him. His people made a regular little community of up-timers in Erfurt now. He'd encouraged the men to bring along their wives and kids, start a little school, a health clinic.

He saw Tony Adducci coming up the walk and wondered if Denise was with him.

Denise was still at the car, getting little Rosemary into the chest sling she wore and picking up all the various impedimenta and paraphernalia that accompanied a baby through life.

"Denise, I don't think I can do this," a voice said from the back seat.

"Pat, if you don't, you're going to kick yourself for the rest of your life." Bernadette Adducci gave the woman next to her in the back seat an impatient shove.

"If I do, I may kick myself for the rest of my life, too."

"Well, at least it will be for a sin of commission rather than for a sin of omission," Bernadette said. "Get out, Pat, and walk up to that door."

So Denise's cousin Pat got out and walked up to the door, in between the other two women.

Thinking, when she stepped through, that it wasn't fair of God to have put Dennis right there next to the guest book.

"I'm sorry about Juliann," Denise was saying.

"It was better for her, in a way," Dennis answered for what seemed like the fiftieth time that afternoon. "She was able to keep going in her own house right up to the end. Ma wouldn't have liked a nursing home. Or having her mind slip."

Behind Denise. A neat cap of gray hair. Pat?

At the very least, Pat thought, he could have been at the back of the parlor somewhere. Maybe with his back turned, talking to Jenny Maddox. Not taking her hand and thanking her for coming.

What were they doing, Pat wondered, the two of them, standing here, in the way of other people who wanted to come in?

Bernadette grasped Pat's shoulders, turned her around so she wasn't blocking the door,

entered the parlor, and looked for Tony. He was over next to Joe Stull and both of them were talking to the Reverend Mary Ellen Jones from the Methodist church, Henry and Veronica Dreeson, Enoch and Inez Wiley, and the two girls, Annalise and Idelette. *What a world*. Tony and Joe, cabinet secretaries for a cobbled-together state government in a world none of them had ever expected. Which they certainly wouldn't have been back home in West Virginia.

Behind her, Pat was saying something to Dennis. Not a platitude about Juliann. "Noelle is thinking about becoming a nun."

"For my part," Dennis said, "I'd rather that she managed to think around and beyond that idea. Considering that I'm a Methodist. Not that I have anything to say about it."

"She's down in Franconia this summer working for the Department of Economic Resources. But she's thinking about it."

"God Almighty," someone yelled from outside. "Look out. Get down."

Bernadette turned and ran for the door, pushing Pat farther to the side and grabbing for her police revolver. She might be "only" a juvenile officer, but that didn't mean she was unarmed. Older juveniles could be dangerous, if only because they were so much more unpredictable than adults. Not to mention their parents.

Someone out there had a gun. Joe Stull and Tony Adducci headed for the door after Bernadette. A wild shot came flying into the parlor. Maybe not that wild; two more went into the weatherboarding near the door. Then another one inside.

In the parking lot, a man was down; another man on top of him.

"God on earth, Keenan, what is going on?" Bernadette screeched.

Keenan Murphy looked up. "He's been working himself up to it ever since he saw in the paper that old Mrs. Stull was dead. Saying over and over, 'She didn't come and stand by me at my father's bier. If she goes and stands by Dennis Stull at his mother's bier, I'll kill her.' He was over at Grandma's. She was trying to talk him out of it, but he's as drunk as a skunk."

"Damn you, Francis Murphy," Bernadette said as she handcuffed him. She sounded like she meant it quite literally. "Somebody call the station and have them send an on-duty patrol over here. Is anyone hurt?"

"I hope not," Keenan said. "I really couldn't see that it would help things if he caused trouble here today. They've been separated for a quarter of a century. That was what Grandma said. That it wouldn't help things if he caused trouble here today and I should try to get him to come back. So I came after him. I didn't know he had a gun. That's a whopper of a handgun. I just thought he'd be likely to try to beat her up. And then he saw her, getting out of Tony Adducci's car and walking inside, and he pulled the gun out, so I tackled him. If he hit someone, I hope it was a Kraut."

Bernadette looked down. Keenan was still sitting on the asphalt next to Francis. Keenan was hostile, not particularly bright, prejudiced, a 250 Club regular, one of the town's constant brawlers and troublemakers. He was not an ornament to the military of the State of Thuringia-Franconia in which he served. Before the Ring of Fire, he had been chronically unemployed. However, owing to the fact that he had chased Francis and brought him down before he got inside the funeral home, they had probably been spared several injuries or worse. So she swallowed her bile and said, "Thank you."

"You're welcome," he said. "It's not as if this is something we can blame on being here and now. He'd have probably done something of the sort whenever old Mrs. Stull died even if we'd all

still been back home in West Virginia."

"Tony," someone called from inside the funeral home. "Joe."

Joe Stull and Tony Adducci ran back toward the door. Aura Lee was standing there.

"Nat and Twila took Eden and the babies home."

"I sure don't blame them," Tony said. "Especially considering that Francis Murphy's been working for Ollie Reardon since the army threw him out. Even the fact that he was one of our few genuine Viet Nam combat veterans couldn't make up for the way he drank."

Joe stopped next to Aura Lee, putting his arm around her. Tony went on inside.

Pat Murphy was sitting on the floor next to Dennis, crying.

Tony stood there, looking at her.

"It was Francis," he said. "Drunk, with a gun. It's under control."

She looked up. "The church absolved me for everything else. For leaving Francis. For loving Dennis, for having Noelle. But Dennis wouldn't live with us unless I divorced Francis and married him, and that was the one thing the church wouldn't ever have absolved me from. For that, they would have excommunicated me until the day I died and sent me to hell."

"Yeah," Tony said. He couldn't think of anything else to say. It wasn't anything except the truth, after all.

"They didn't hand annulments out back then they way they did later to Massachusetts politicians. And Father O'Malley said that even if I got one, the church would never let me marry Dennis because we had already committed adultery together and it was an 'absolute impediment to matrimony.' That we couldn't benefit from our sin. If I'd spit in his face then, we could have had these last twenty-five years together."

Denise handed the sling containing Rosemary over to Tony and knelt down next to her cousin. "Honey, I'm so sorry we talked you into coming."

Pat looked up. "I'm not. If I'd spit in their faces the first time Dennis asked me to marry him, back in 1965, we'd have had forty years and I'd have never been married to Francis at all. But no, it was my *duty* to marry a good Irish Catholic man and produce Irish Catholic children, Pa and Father O'Malley said. Marry Francis, so if he was killed in Viet Nam, at least he would leave a child behind him. See what it got me."

She looked toward the door. "What went on outside?"

"Keenan followed him from Maggie's. Tackled him," Tony said.

"Would you thank him for me? God knows, I've not been any kind of a mother to him. But I'm staying with Dennis. I figure that if I spit in their faces now, we might edge out five or ten years, still. More, if we're lucky."

An ambulance pulled up outside.

Bernadette, who was still standing there, not able to check on what was happening inside, said, "I asked for a patrol."

"They're on the way," Jenny Maddox yelled from inside the funeral home. "We called for the ambulance. The second bullet that came inside hit Dennis. He needs to go to the hospital. The other one glanced off Idelette Cavriani's shoulder and then hit Juliann in her coffin. I've done first aid for her. Idelette, I mean. Not Juliann. For Juliann, I just closed the coffin, considering that she was dead already. But if she hadn't been, she would be now."

Bernadette added "mutilation of a corpse" to the rest of the charges on which she was arresting Francis Xavier Murphy.

* * *

Once the ambulance and patrol car left, the visitation resumed, though only Joe and Aura Lee of the family remained to do the honors. And Billy Lee and young Juliann. Billy Lee went over to stand by the guest book, taking Dennis' place. Juliann went and stood by Idelette and Annalise.

"Maybe," Mary Ellen Jones was saying, "we should postpone the funeral until tomorrow."

"I don't think that would do any good," Joe said. "I don't think that Nat and Twila will be any happier to have Eden here tomorrow than to bring her back later today and it didn't look to me like Dennis will be up and about again by tomorrow."

Count August von Sommersburg had observed the entire event with considerable interest, admiring the general aplomb with which people had handled the shooting and feeling comfortably confirmed in his general Lutheran assumption that most of the bad things that happened in life were somehow the fault of the Roman Catholic church.

Now he found himself standing next to Charles Jenkins, whom he had already met through the Schwarza-Saalfeld Enterprise District and the Grantville Development Authority. Although not at that meeting in regard to a baseball stadium. On other occasions.

Jenkins' wife had come in with him, as had Willie Ray Hudson of the Grange. The wife of Joseph Stull had hugged them and called Jenkins' wife "Sis." Count August analyzed the family connection and decided this might be a favorable occasion to obtain some information.

Particularly in regard to the views of Secretary of Transportation Stull in regard to financial chicanery. The count was beginning to suspect that Cavriani had been quite correct in his assessment that a fair number of the up-timers had no patience with it at all, in spite of the assurances that Drachhausen had received from Daniel and Delton Cunningham that Stull could be "managed."

"What is the word?" he asked. "Righteous. Is Mr. Joseph H. Stull a righteous man?"

"'Righteous' is a mild word for it," Jenkins said. "Plus, Aura Lee is an auditor, you know."

The count had known that Stull's wife was an auditor already and had suspected the presence of righteousness, so he was not unduly disappointed. Cavriani had, after all, warned him.

"I'm not the favorite person of either Joe or Aura Lee," Jenkins went on, looking at the group gathered by the coffin. "Not that they haven't been perfectly polite over the years. They just don't particularly like me."

The count nodded.

"It goes back a long ways. Most things do, in a small town."

Count August understood that himself. The ongoing episode of the necklace bequeathed by his wife's aunt, for example, he thought absently.

"Aura Lee and I went all through school together in the same grade. She accused me once of 'taking advantage of my advantages.' Most of which consisted of unlimited access to cars. I've sometimes suspected that Debbie picked up Aura Lee's view that I was a 'lout' when I was in high school. I don't think I was worse than any other guy in my class. But Aura Lee was comparing me with Joe who was a couple years older and in the service. Debbie was enough older that she probably never noticed me back then. I was all of thirteen when she married Don Jefferson and quit school for a year to follow him to where he was stationed and then, when he shipped out to

Viet Nam, to come back and have Anne.

"Aura Lee and I went to the same senior prom, naturally, since we were in the same class. May 1976. She pulled a surprise by showing up with Joe after she'd turned down every guy in the class who asked her. Which just about every guy did, naturally enough. All the ones who weren't either too shy or too intimidated."

Count August looked across the room toward the bier once more and nodded appreciatively. The two daughters of Herr Willie Ray Hudson were, even well into middle age, very pretty, like a pair of little ornamental figurines.

Jenkins looked in the same direction, fixing his eyes on Joe Stull. "He had managed to get home on leave. He was a couple of years older than us, in the army. He came in his dress uniform. At the time, I thought he was showing off. It was years later, after I'd married Debbie, that I realized that he probably didn't own a suit and couldn't afford to rent a tux."

Count August nodded, thinking of what Cavriani had told him of Stull's mother—the woman to whom, in theory, they were now paying their last respects.

"Anyhow," Jenkins continued, "a custom had grown up—the administration didn't like it, but it had grown up—that each couple at the prom dance would go into the spotlight and kiss during one particular dance. They didn't like it because of course a lot of the guys pushed it to the limit, almost pawing their dates. Including me. I'd brought Anita Shockley, who was a junior and willing to put up with quite a bit to have an invitation to the senior prom. She married Freddie Congden a year or so later, right after graduation, so being pawed by me was definitely not the worst thing that ever happened to her."

"Anita was?" the count asked.

Jenkins nodded. "The girl in regard to whom Aura Lee made that accusation about taking advantage of my advantages."

He smiled a bit sarcastically. "So that was how things were going. Then Joe and Aura Lee came up. They gave big smiles, clasped hands, and two-stepped out to the middle of the room, like 'promenade your lady' in square dancing, only it was something that he'd picked up down in Louisiana, where he was stationed. They got to the spotlight and he twirled her under his arm, he gave a formal bow, she curtsied, he brought her up, their lips barely brushed, he twirled her around again, back into place, and they promenaded to the other side. Well, that brought the house down. It really did. Everybody else looked pretty shabby after that performance."

"Ah," Count August said. "Perhaps they appeared somewhat more polished than the rest of you?"

"The rest of us were not very polished at all," Jenkins admitted. "So a while later at the punch table, I managed to remark to Joe that he really hadn't gotten much out of it. He gave me a disgusted look and said that Aura Lee was a princess and deserved to be treated like one. Added that the way I'd treated my date showed pretty well where I placed her on the food chain. Which pissed me off. Of course, he was a long way mentally from high school by then. But Joe still thinks I'm a clod. He thought so then and he still does. On the other hand, it demonstrates just how flexible his mind is. I'd never let a man like him work for me. All the flexibility of a rock. Doing what he does for the government, sure. But never for me."

Count August found it a little surprising that Jenkins was still so . . . discomfited . . . by his brother-in-law's opinion of him that he would remember that night so many years later. If Stull indeed had a personality that could create that kind of discomfort in an otherwise brash man and

have it last for thirty years . . . But if they hadn't married sisters, it would probably be nothing more than a forgotten moment in time. Life was like that.

But. He pondered the situation for a few minutes, while continuing to make polite conversation.

It was useful to have confirmation of Cavriani's suspicion that there was another major obstacle, beyond Adducci, to Bolender's various plans. Jenkins was a deal-maker. Not unethical by the up-timers' standards, but a deal-maker. As was Willie Ray Hudson, for that matter. Stull? *All the flexibility of a rock.*

He decided that he would accept Cavriani's advice in regard to procedures for purveying gravel and cement to the government of the State of Thuringia-Franconia. He concluded that he would refrain from investing in the baseball stadium project.

Elsewhere in the USE, of course, other options and procedures would continue to be open for his corporation.

Politely excusing himself to Jenkins as a couple he did not know approached them, Count August made his way across the room to Tony Adducci.

"In the spring," he said, "you offered to introduce me to your father, that I might hear more 'yarns' about your quasi-mythical Jock Yablonski from a man who had known him in person. If that offer still stands, I would like to have this opportunity."

Part II: The Green, Green Grass of Home

July, 1634

"How's it going, Brother?" Joe Stull pulled up a chair next to Dennis' bed in Leahy edical Center.

"Not bad, under the circumstances. Looks like I'll make it. And I'll never have to worry about getting appendicitis any more, considering where the bullet went. The surgeon did a neat job, but says that my hip on that side will probably remember this in cold weather right to the end of my days."

"I came over between the visitation and the funeral to give them permission to operate. Everyone says that if Nichols is out of town, which he was, up in Jena, this Dr. Scultetus from Ulm is the surgeon to go with if a person needs to be cut and pasted. Pat agreed, and she should know since she works for the sanitary commission. But they wouldn't take her signature as next of kin, so she called me."

Dennis smiled beatifically. "She stayed all night. I don't think she slept. You just missed her. She went off to file divorce papers against Francis. She left in time to make sure that she'd be there when the office opens at eight this morning."

A little more seriously, he said, "Which means that she's decided that she would rather have me than heaven. I never doubted, you know, why she wouldn't marry me. Never thought that she was giving me excuses. She really did believe that if we married, God would send her off to the eternal fire prepared for the devil and all his angels, where there would be weeping and wailing and gnashing of teeth. I don't doubt that she still believes it. Not a bit."

Joe tipped the straight chair back on its hind legs. "It's going to be a shock for Noelle when

she hears about it."

"Yeah. There's that. It's nice that Maurice Tito is keeping the court offices open on Saturday. Otherwise, she'd have had to wait 'till Monday."

Joe steepled the tips of his fingers together. "I think they must have put something in Grantville's water in 1957. Something along the lines of 'ExtraZip' or 'SuperCharge.' That year didn't just produce Aura Lee and Chad. I remember one day in the summer of 1974. Aura Lee and I went for burgers. We picked them up and she marched me over to a booth where some of her friends were sitting."

He grinned. "Nat Fritz, Martha Wright, Renee Warner. That bunch. The other little college-bound princesses. Two teachers and a guidance counselor, now. That's Natalie Bellamy now. Martha married Keith Trumble; Renee married Maurice Tito, the judge, which is how come this sprang to my mind all of a sudden."

"I don't know," Dennis answered. "It may just be that for some reason, that year, Grantville's 'best and brightest' didn't leave to find jobs somewhere else. The kids born in '57 were just barely old enough to have gotten settled with jobs they could hang onto when the slump hit in the middle of the nineteen-eighties. For the next few years, maybe only half of the kids who went away to college or into the service came back. Or stayed if they did come back. It was quite a brain drain. A person can only speculate what kind of a dynamo we would have dropped into Thuringia if we'd had a set of people like those from every year since 1950 or so. Plus, when you come to think about it, Nat and Renee went out and recruited. Brought Arnold and Maurice back to town with them."

Joe nodded. "Eloise Agnew, too, though she wasn't sitting there that afternoon. She was the same year in school. She married Douglas Curtis and he's the minister at the Church of Christ, now."

He grinned. "They started talking about what to do that evening. Aura Lee said that she was expected to show up at some kind of wholesome activity for teens at the Methodist church and her dad would pick her up at ten. I asked if they all wanted me to drop them off there. Renee said that wholesome Catholics weren't supposed to go to wholesome Methodist activities. Martha ditto for Church of Christ, but Nat was also headed for First Methodist, so I dropped the two of them off to play musical chairs and see a slide show about needy people in Africa and went to the drive-in with a couple of guys. Ingram Bledsoe and Chuck Rawls, in case you're curious, and we saw *Blazing Saddles*."

Dennis wondered idly why one particular day in the summer, thirty years in the past, would still be so clear in Joe's mind. Memory was a funny thing, sometimes.

"You know what Bernadette said after you and Pat went off in the ambulance?" Joe went on.

"Not having been there any more, no."

"She said, 'That doesn't make sense. Father O'Malley told Pat that if she got an annulment, she still couldn't marry Dennis because she'd committed adultery with him. But what an annulment does is say that there wasn't any marriage. So if she hadn't been married, she couldn't have committed adultery.' The last I saw her, after the funeral, she was headed off to St. Mary's to quiz the Jesuits."

"It would be a big relief to Pat if she hadn't committed adultery," Dennis said. "But I'm having trouble wrapping my mind around this one. I'm damned sure she was married to Francis Murphy. I was working in Clarksburg then. I took off work and sat by the phone the day she did

it. Until she hadn't called and I knew she'd gone through with it. Drank myself into a stupor, even though I normally don't drink much. I came so close to taking myself down that the other guys called an ambulance and hauled me to the hospital to be pumped out."

"It's a bit esoteric for a Methodist, yeah. Let them worry about it."

"I never looked her up, you know," Dennis said. "Not even after I heard that she'd left Francis. I ran into her again by accident, coming around a corner by the old hotel in Grantville. She had Maggy, Pauly, and Patty with her. A few crows feet around her eyes; she'd put on about a pound a year, most of it in her hips, and tired—she looked so tired. We just looked at each other and I said, "Come with me."

"Nothing like the direct approach," Joe said.

"So we went over to Ma's and I asked her if she could watch the girls for a bit. She got up and said, 'I'm Mrs. Stull. I've got some M and Ms and we're going into the kitchen to learn how to make big cookies with smiley faces on them.' Pat and I went up to my old room. When we came back down, the cookies had been baked and eaten and Ma was teaching them to sing parts. Maggy on lead, and the other two, even little Patty, who could barely talk, coming in on, 'It was an itsy-bitsy, teeny-weeny yellow polka dot bikini.' They'd saved us each a cookie."

"Yeah," Joe said. "Ma deserved a better visitation than she got. There should have been more people there who remembered her. We should write Harlan over in Fulda and get him to send us his favorite 'Ma story.'"

"What's yours?" Dennis asked.

"Aura Lee's family is a little screwy, and that's the truth. Nothing wrong with Willie Ray. Ray and Marty and their kids are okay. But Vera's been high-strung all her life and she took it out on Debbie. It made Aura Lee a bit antsy about settling down with me, being afraid of all those dramatic confrontations. In '83, when the federal black lung office in Parkersburg got in touch with Ma and told her that Pa had died in Florida and she was entitled to widow's benefits, we came up to Grantville. I stayed at Ma's, of course, and Aura Lee out at her folks. Never anything to embarrass the Hudsons. Since she was an accountant, she spent all day Saturday helping Ma fill out all those forms and papers. Vera was just furious. Then on Monday—I'd taken a day of leave—we took Ma to Parkersburg to turn them in. Aura Lee's name was on the papers as the person who prepared the forms."

"I don't think I ever heard this," Dennis said.

"Ma could keep her mouth shut. The claims examiner in Parkersburg asked Aura Lee what she was. She gave them her job title and bureau. The woman said, 'No, I mean your relationship to Mrs. Stull.' The two of us just looked at one another and finally she said, 'Joe here is her youngest son and I . . . we . . .' I guess she couldn't think of any word that wouldn't sound awfully stark if she said it out loud. Ma said, 'For close to ten years, now, Miss. I trust her.' The bureaucrat wrote down, 'family friend.' When we got back to Charleston, that was when I moved into her apartment, for all practical purposes. Which was where things stayed stuck for the next four years, but it was progress."

"Yeah," Dennis said. "Ma deserved for us to make a scrapbook for the kids, at least. With her name on the front, 'Juliann Stull.' And the dates."

"What are you doing about telling Noelle?" Joe asked.

"Pat's going to write her a letter. Tony will send it down to Franconia in the government mail bag and it should catch up with her eventually. Do you know what Pat was telling me, just when

the bullets started flying?"

"No. I was over by Ma's casket."

"That Noelle's thinking about being a nun."

"Now that downright sucks."

"That's kinda what I thought. Not that I have anything to say about it. Pat and I were together over a year that time. I shouldn't have left her, but it just hurt so damned much when she still wouldn't divorce Francis and marry me, after she got pregnant. I went and watched when Pat had her baptized over in Fairmont. Not sticking my oar in. I just sat on a pew way in the back of the church and watched. She's grown up to be a fine girl."

"Since you'll be marrying Pat, you probably ought to practice saying 'daughter' now. At least, if she's willing to claim you after all these years." Joe tipped his chair down again and got up. "I suppose that I ought to be getting over to the office."

"Maurice Tito's not the only one who keeps Saturday hours these days."

"There's a lot to be done. And you know what they say about the early bird catching the worm. These days, more often than not, it seems that I'm spending more time trying to dig up slimy worms than actually making progress on improving transportation."

"Well, you know that you can rely on us in Erfurt. Anything even the least bit funny looking that comes through procurement will get flagged for your and Tony's attention right away."

* * *

"Tony," Horace Bolender complained, "will you please quite humming that horrible song?"

"Tut, tut," Tony Adducci answered. "Country music covers all the emotions and actions to which human flesh is heir. Especially country oldies. 'If you've got the money, honey, I've got the time.' With a nice dose of narcissistic self-pity frequently, I have to admit. 'Honky Tonk Angel.' What do you have against 'The Green, Green Grass of Home'? Why do you object to "Long Black Veil'? How can it be that 'Ring of Fire,' of all possible selections, offends you on this fine summer morning?"

Bolender glared at him and went on down the hall toward his own office.

Tony continued his less than fully melodious greetings to a new day as he sorted through his in-box.

Country music did just about say it all. Although Ron Koch, the engineer out at the mine, maintained that no American country song ever written could quite equal the classical simplicity of the German:

Du, du, liegst mir im Herzen,
Du, du, liegst mir im Sinn.
Du, du, machst mir viel Schmerzen,
Weisst nicht wie gut ich dir bin.

You, you, rest within my heart;
You, you, rest within my senses.
You, you, cause me a lot of pain.
You don't know how good I am to you.

That particular verse, Koch insisted, grasped the whole essence of the heartbroken misery of a male faced with a female who did not appreciate him even though he thought she should. It comprised, Koch maintained, the essential Platonic Idea of a lament on this topic, without complications and specifications, requiring no particular setting, but being of universal and worldwide applicability. It could be translated into any other language with no changes required. He and Tony had addressed the matter over many a beer at the Thuringen Gardens.

Tony rather liked Koch. He mildly resented the fact that he had never come up with anything to match that song, though. Some day, one would occur to him.

He made the in-box last as long as possible. Then he resigned himself to the need to think about other things.

One of the few topics that country music failed to address was the intricacies of Catholic canon law. Tony couldn't think of a single song about that. Bernadette had really set the Jesuits in a tizzy last night. The conundrum she had set them was just the kind of moral theology puzzle they could debate endlessly.

The practical answer, however, appeared to be that since Larry Mazzare was now a cardinal, if not, apparently, a bishop, the precise status of Pat and Francis Murphy's marriage, from the viewpoint of the Catholic church, was going to have to wait for him to come back from Italy and think about it.

Tony sat down and looked out the window, wondering what Noelle was going to think about it.

Pat said she was going to write, but who knew how long it would take her to get her nerve up and put some actual words on paper.

It wouldn't be a good idea for Noelle to find out any of this by reading a copy of the *Grantville Times* that made it to Thuringia.

Plus, he was, after all, the girl's godfather. He had responsibilities.

He pulled out a piece of paper and started to try to think of words. Finally, he just told her exactly what Pat had said while she was sitting on the floor next to Dennis at Central Funeral Home. Sealed the letter with considerably more glue than usual. And hoped for the best when he took it down to the booth where the security guard sat and dropped it in the mail pouch.

* * *

"So," Carol Koch said, "you can see something of my dilemma. Then Aura Lee recommended that I talk to you. Natural enough, since I'm working with math and statistics and you're a math teacher. A lot more natural than if I go trekking off to talk to your father for no apparent reason."

They were in a corner of the teachers' lounge at the high school. Natalie Bellamy uncrossed her legs; then crossed them again. "I know that Arnold gets involved in this sort of stuff, to some extent. It's unavoidable, working for the Department of International Affairs."

Carol waited patiently. As patiently as possible, for quite a while. It didn't seem to be doing any good, so she started talking again. "We looked at all the personnel and ended up focusing on Gordon Fritz. Of the previously retired people working for the Grantville Research Center, it seems to us that he is about the only one with the background to pick up on what we'll be looking for. To see the patterns developing and the connections between one thing and the other. Proposals; financing; backers; outcomes. Connections between what crosses Laura Jo's and Beverly Kay's desks and who brings it in, who's assigned to research it."

"Dad's seventy-seven years old."

"Not too old to keep his eyes open," Carol said.

"Mom would strangle me if anything happened to him. She's only seventy and counts herself lucky not to be a widow already."

"Good grief," Carol said. "There's nothing going on here that's likely to be dangerous."

Natalie gave her a hard look. "You're not from around here, Carol. Anyone who steps between Horace Bolender and a lot of money is likely to be in danger. Probably not directly from Horace. He's not the violent type himself. But he wouldn't be past making suggestions. Giving hints. Employing a couple of unsavory types. Especially not since his father died last February and isn't around to rein him in any more."

Carol's face was a study.

"If Tony didn't tell you and Ron that before he put you onto this project," Natalie said, "then he's guilty of misleading advertising. Especially since Tony thinks that Horace is working with Dan and Delton Cunningham. Both of them have plenty of access to unsavory types. Rough types. Delton was in prison for a while before he married Bev—he was one of the people caught up in the scandals around Arch Moore's second term as governor. Dan didn't land in prison, but a lot of people thought he probably deserved to more than Delton did. He's a lot more ambitious than Delton, but he's a lot smarter, too. He probably managed to cover his tracks pretty well and was a small enough fish that it wasn't worth the while of the federal prosecutor's office to go after him."

"I probably ought to ask Tony a little more about this."

"You certainly should. And let's have dinner one day later this week. At Tyler's. I'll shovel you all the dirt you'll need to avoid ticking Dad off, if you do end up working with him." Natalie sighed. "And I'll talk to Dad about it. Open up the subject."

* * *

"So that's Dad and Mom," Natalie said after dinner. "Just as long as you stay off the topic of Arnold when you talk to him, you should understand one another fine."

"Definitely attached to one another." Carol looked around for her purse.

"Way back, after our senior prom, all of us were out in the parking lot, getting into cars to caravan over to the Methodist church for the after-party. That was when we were still in the old building, not the nice new consolidated school we have now. Dennis Stull was parked there in his pickup, waiting to drive Joe over to Fairmont to catch a bus back to Louisiana. Joe and Aura Lee kissed goodbye. Just a hug and a kiss, the kind that said, 'I love you, I'll miss you while you're gone and I hope you come back soon.' An embrace, if you want to call it that. Head to toe, but no . . . urgency. No pawing each other."

Natalie got up. "Joe's burly like most of those Stulls, but not so tall that a tiny girl like Aura Lee looked silly kissing him. He's five-seven, maybe? Not much more, for sure. I'm taller than he is when I wear heels and I'm five-six. The minute I saw it, I realized that the answer to the 'do they or don't they' question that people had been asking for a couple of years was that they most definitely did. And had. And would again. And knew it for sure. It was exactly how my parents kissed each other goodbye when Dad was going off to an insurance convention or something. A no-fuss, married kind of goodbye kiss."

"How did the rest of the kids take that?" Carol asked.

"The other kids were very unimpressed. Didn't even really look at them. Nobody else noticed except Mrs. Fielder—the mother of Marietta, at the library. I know you've met Marietta; she's

about our age. Mr. Fielder was the science teacher back then. You know him, too—he came out of retirement after the Ring of Fire and started teaching again. He and his wife were chaperoning the prom, along with a lot of other teachers, of course. She was standing behind me and what she said, sort of under her breath, was, 'I wish them well. They have a long haul ahead of them if they're going to make this work.' She was an old friend of Aura Lee's mother, of course. They were in a lot of the same clubs and things. They'd even been in the same church before Mrs. Hudson changed from Disciples of Christ to Methodist when she married Willie Ray."

* * *

"I saw your friend Carol Koch having dinner with Natalie Fritz—Natalie Bellamy—at Tyler's last evening," Debbie Jenkins said to Aura Lee.

"I introduced them," Aura Lee said. "They should have a lot in common. Carol's been pretty slow to get to know people around town. Not standoffish. Just slow. Nat's more outgoing."

"Nat and you and I were in school together all the way through," Chad Jenkins said. I don't think I'd pick 'outgoing' as the right word. 'Blunt,' maybe. She always tended to say exactly what she thought whether it was suitable to the situation or not."

"How did she come to marry Mr. Bellamy?" his daughter Missy asked.

"She met Arnold up in Morgantown. He's five or six years older than she is, I think. He had an undergraduate degree in history and had come back to get his certification in secondary social studies. She married him in the Newman Center chapel the fall of 1979, part way through her senior year, with none of her relatives there except her brothers Vern and Gene, because Gordon and Verlinda Fritz weren't willing to accept a Catholic 'foreigner' from New Jersey as her husband. Though they came around, more or less, after the deed was done and he was a fact of life, so to speak."

Missy contemplated the question of why any woman, even a somewhat overweight math teacher, would want to marry Mr. Bellamy enough to defy her parents, shuddered a little, and dismissed the topic from her mind hurriedly. Some things just didn't bear thinking about.

Not that Mr. Bellamy had been a bad teacher. He'd come back to the high school to teach the intensive constitution and government course for the six "accelerated" kids who graduated in August 1633. A funny course—they had classes three or four hours a day sometimes when he was in town and then none when he was off doing other things for Mr. Piazza. He'd made it pretty plain that it was their responsibility to carry on under their own initiative when he was somewhere else representing the NUS government.

"They named her after Natalie Wood," her father was saying absentmindedly.

"Who?"

Chad contemplated the ignorant little barbarian who was also his daughter the future information librarian. "She was Verlinda's favorite actress. *Rebel Without a Cause* with James Dean, and a lot of other films."

"Oh. I've heard of James Dean," Missy said.

"Pity that Nat didn't turn out to look more like Natalie Wood."

"Stuff it, Chad," was Aura Lee's comment on that.

August, 1634

"Dennis is up and about and back in Erfurt," Joe Stull said. "Pat's winding up everything she does at the sanitary commission, turning it over to Marianne Dormann, so she can go up and join him. They'll get married as soon as Maurice Tito doth civilly put Francis and Pat asunder. Which he is distinctly on the fast track to do; seems to think that when a man shoots at his estranged wife, even if he misses, the marriage is essentially defunct, especially when they've been separated for a quarter of a century. And now that Pat has finally made up her mind, she's not going to wait a bit longer than necessary."

"How is this going over with all of Dennis's respectable employees?" Tony asked. "Of course, I can ask Regina if you don't feel comfortable with saying."

Regina was married to Tony's brother Nick, who was in Erfurt working for Dennis.

Almost all the civilian Grantville families in Erfurt were working with or for Dennis Stull on military procurement. The men had gone in the autumn of 1632, right after Mike Stearns had made the alliance with Gustavus Adolphus. Dennis had encouraged them to have their families join them as soon as possible. He believed strongly that a happy work force was an efficient work force. Once Regina finished her teacher training—she had come back to Grantville as soon as the two year program for mature women opened up—the American community would have its own school. Until then, the other mothers, collectively, were home-schooling the kids using a curriculum that Laurie Beth Walker had for her children before the Ring of Fire.

Dennis had paid education costs for all of the wives, on a "no strings attached" basis. Some of them had taken CNA training before they moved, for example. They'd set up a little health clinic, open to down-timers as well.

But, as it happened, most of them were either pretty strongly Church of Christ or else nondenominational Evangelicals. Tony was a bit dubious about how well they were going to accept Pat. From the point of view of some of them, Pat would be about as fallen as a woman could get, short of being outright promiscuous. What with her having lived with Dennis before she married Francis, while she was married to Francis—two episodes of that counting the present—and, presumably, after she was divorced from Francis until they got the knot tied.

"Lorrie Gorrell will be nice enough to her," Joe said. "Lorrie's the sister of Fred Pence, who's over at Fulda working with Harlan. And Amber Lee Barnes, of course."

Tony laughed. Amber Lee had been in the military from 1631 to 1634. She and Scott Blackwell, who was the military commander down in Wuerzburg, had gotten a divorce a couple of years before the Ring of Fire. Frank Jackson gave her a compassionate discharge when she married Sterling Pridmore and the blessed event turned out to be twins, rather than accommodate the babies in the Erfurt Supply Depot, although Amber Lee was quite willing to soldier on. Dennis promptly hired her as his executive assistant, to continue as a civilian doing the job she had done in the military, so the twins were spending their days in the Erfurt Supply Depot anyway.

Joe laughed, too, at the thought of Amber Lee. "A couple of the others may be a bit stiff at first. But Pat can find plenty to do, ramping up their little clinic into a satellite of the sanitary commission. It should help a little that the others are all fifteen or twenty years younger than she is. Or more. Most people have trouble being outrageously disrespectful to someone who's old enough to be their mother."

* * *

Amber Lee Barnes looked up from her desk in the Erfurt Supply Depot. Jim Fritz was standing there. Silently, as usual. It never occurred to him to say anything on the order of "excuse me." He just stood until someone noticed him.

Right now, he was looking at the bassinets in which Jamie and Pel were sleeping—both, O wonder of wonders, sleeping at once. She grinned at the twins affectionately. Jamie had been born very close to midnight on March 31. She had thought that Tucker Conway, the EMT who was serving as midwife, was joking when he said, "There's another one." But Pel had arrived as an April Fool, right after midnight, so someday she would have to do a lot of explaining about how a person could have twins with different birthdays.

When she said, "Good morning, Jim," he said, "They're different. They don't stay the same."

"They grow, Jim. They get older. When they grow, they change."

He thought about that for a while. Finally he nodded. "People do that. Things stay the same. Or they should, unless somebody changes them."

This was almost certainly a signal that Jim, the way his mind worked, had noticed something that was different from the way he thought it should be. Dennis had told him to look for things that were different, so he was doing that.

"Do you want to see Dennis?" she asked.

It turned out that wanting to see Dennis was the reason Jim was standing there. Working with Jim Fritz could be a little different sometimes, but if you could figure out the clues he sent, he just about never wasted a person's time.

Jim didn't really like to talk to people. If he absolutely had to talk to someone, he preferred to do it over in the closed-off side shed where he managed the R&D inventory. As things were, however, Amber Lee thought . . .

"Go into Dennis' office," she said. "He got shot. He shouldn't walk over to your place unless he has to. He's on crutches because his hip still hurts."

"That's right," Jim answered. "He got shot. His hip hurts. I'll go to his office."

As he went, he looked back at her rather reproachfully. "Things shouldn't be the wrong shape."

* * *

"The news from the pre-opening teachers' meeting front," Natalie Bellamy said, "is that Fran has left Horace Bolender."

Idelette Cavriani and Annalise Richter sat quietly, hoping that their presence had been forgotten and that they would learn a lot more about the peccadilloes of the adults in authority over them.

"Fran is?" Carol asked.

"The librarian at the elementary school," Aura Lee inserted.

"She announced it generally, because she took Dustin and Damien with her. Dustin's seventeen now—he'll be a junior—and Damien's fifteen. He'll be a freshman. She doesn't want them leaving school and going anywhere with Horace, if he comes asking for them."

"That has to be a pretty desperate step for her," Aura Lee said. "She's from Fairmont. Her parents and brothers all lived over there. She doesn't have a soul in Grantville to rely on except herself, if she's leaving Horace."

Natalie picked up her coffee cup. "She said that she's going to file for divorce before school

opens and try to get a legal temporary custody order for the boys from Maurice Tito. That's all she said publicly. She's Methodist, of course, so I may be able to pick up bits and pieces more around church, even though the Reverend Mary Ellen is properly closemouthed about things like this. It'll be harder for her to keep Horace away from them at church than at home or school, though, since he's a Methodist too and has a perfect right to be there, so something may come up. I imagine that Mildred—that's Horace's mother—is just livid."

Annalise couldn't resist. "Sheryl Cunningham is Horace Bolender's niece and she left home too. She's been an apprentice engineer down at USE Steel for two years, but she's been taking the commuter bus from Grantville. Now she's moved out, down to Kamsdorf, into employee housing. She's been going with Ward Alberts for a while. He and several other of the military EMT trainees showed up at her house Saturday morning and just stood there looking at her father while she took her stuff out of her room."

Carol Koch frowned. "Sheryl is?"

"Dan and Laura Jo's oldest. Well, Laura Jo's oldest and probably Dan's. Anyway, he acknowledged paternity at the time. She was born in 1981, but they didn't get married until 1986. The two younger kids were born after they married. It was right after Delton went to prison that they got married," Natalie said. "A lot of people thought that Dan was taking out insurance—that Laura Jo knew something about his involvement in the corruption scandals and wanted to marry her to keep a wife from testifying against her husband, if it came to that."

"Sheryl and Ward are going to get married in January, after Ward finishes his training," Idelette contributed. "He's going to come back to the Presbyterian church because his mom wants him to and Sheryl's going to switch over from Methodist. They came to talk to the Reverend Enoch about it." She was hoping very hard that she had now demonstrated enough grasp of what Aura Lee defined as "reality" that she could attend the high school rather than being tutored.

Aura Lee picked up her coffee cup. "You'd better brief Tony on all of this, Carol," she said. "And I'll talk to Joe. It's the kind of thing that men, bless their hearts, tend to miss until it walks right up and slaps them in the face. There has to have been some kind of a blow-up."

"If Horace tried to get Dustin mixed up in his machinations somehow," Natalie said, "you can be damned sure that Fran blew up. Both those boys are good kids."

* * *

"Attempted rape?" Tony Adducci looked at his sister Bernadette. "We've been trying to get von Drachhausen for a lot of things, but that wasn't one that we expected."

Bernadette smiled back cheerfully. "The charge will do for the time being. It's definitely enough to hold him on, and Sheryl didn't come to any serious harm. Drachhausen still hasn't really come to terms with modern technology and didn't suspect a thing when she backed toward the telephone stand. That's where Dan keeps his handgun, too. So first she pulled the drawer open and got the gun. Then, with it on him, she went through the motions of dialing the police. Of course, she didn't have the safety off, but he found just the idea of the gun intimidating enough, particularly given where she was threatening to shoot him."

"Went through the motions? Safety on?" Tony shook his head.

"I'll get to that in a moment. Hold him a while and he may be prepared to sing songs about other topics. Especially if we manage to give the impression that Horace and the Cunninghams are throwing him to the wolves."

"What about his father-in-law? He is a state senator, after all. Or member of the House of

Lords. Or whatever we're calling it in the latest change-of-names carousel."

"Count August von Sommersburg? He's definitely throwing Drachhausen to the wolves. His older daughter is in town, now, as well as Elena. She's established residence and gone down to take the citizenship class. The minute she takes her oath of allegiance, she's going to file for divorce." Bernadette had a very satisfied expression on her face.

"I believe Sommersburg said something about that possibility to me last spring. I didn't believe that he meant it."

"Whether he did or not at the time, which he may have or may not have, he definitely does now." Bernadette cocked her head to one side. "It could have just been a red herring he was dragging in front of your nose while he made up his mind whether or not to throw in with Bolender. I wouldn't put it past him, but as far as we know, he must have decided to stay out of it. Which is all to the good, since the prosecution of a sitting legislator is always messy."

"What's the background on the attempted rape? As much as you can tell me without undermining the prosecution, of course, Sis."

"According to what Sheryl is telling us, Dan deliberately took Laura Jo and the other kids out to supper on an evening when he knew that Ward was on duty and wouldn't be there with her. Thus giving Drachhausen open season on his daughter. Or step-daughter, as the case may be."

"Nasty." Tony frowned.

"A payoff for services received. The services being currently unspecified, but I have hopes that some further interrogation will elicit information about them."

"I do recall that Sommersburg said that von Drachhausen could be 'personally unpleasant.'"

"Sommersburg shares the basic ethical system of an Elizabethan privateer." Bernadette snorted. "It's just that his operations are land-based and run on wagons and gravel, concrete, and cement rather than ships and pieces of eight. If he said 'personally unpleasant,' there's probably not much a person could imagine that's beyond Drachhausen."

She stood up. "Horace Bolender told Dan to give Drachhausen his chance at Sheryl, since that was what the man wanted." Bernadette's voice was flat.

Tony looked up at her.

"He told Dan with Dustin in the room. Dustin went to Fran. Fran called Preston Richards, so the police were already in place at Dan's house by the time Drachhausen showed up. Which Drachhausen doesn't know, by the way. He thinks that they came bursting in as a result of Sheryl's dialing. Dustin's willing to testify, when we need him, but we don't want Horace to realize, yet, just how much we know."

Tony shook his head. After all the work they had been doing to get the goods in regard to what he and Joe and the others called the "grand scam" now, the corruption that was starting to run through the government of the State of Thuringia-Franconia like a spider web. After all their work that much of the time hadn't seemed to be going anywhere, Horace had been that dumb.

Of course, nine times out of ten, prosecutors got the guy on something like mail fraud rather than for what he actually did.

Life was like that.

* * *

"Ah," Count August von Sommersburg said, "Louisa, my dear daughter."

His dear daughter Louisa looked at him with considerable exasperation. It had been an utterly

horrid trip. Eleonora and August had whined and cried the whole way, their nursemaid had become motion sick so she had to let her get out of the carriage and walk alongside, her usual lady-in-waiting had refused to come beyond Erfurt and stayed behind there, she was two months away from delivering her third child. She had been, at any rate, peacefully in residence at Sommersburg enjoying the fact that her husband was, whether peacefully or not, at least in residence somewhere else, when her father had written insisting that she come to Grantville.

"Papa," she said. "This had better be good."

"Oh, Louisa, it is," her sister Elena said. "It's just marvelous. Since Papa wrote you, Marcus tried to force his attentions upon the daughter of one of his up-time business associates, so we'll be able to get you a divorce with no trouble at all."

"If it's only 'tried to,'" Louisa answered sourly, "then it didn't go far enough for me to get rid of him on the grounds of adultery. Can't the man ever do anything right?"

"Oh, but Louisa," Elena said. "You haven't been reading all the little treatises I have been compiling so carefully and sending to you. Under the up-timers' law, he doesn't have to have succeeded. You can divorce him anyway. Then, really, all we have to do is wait. You wouldn't want to remarry until after the baby you're carrying is weaned, anyway, and that will give Marcus at least two years to do something so dreadful that the *Ehegericht* will divorce you from him, too. The up-timers have lovely proverbs. Jonas Justinus Muselius, the teacher at St. Katharina the Heroic, is collecting them. The one most applicable at the moment is, 'Give him enough rope and he'll hang himself.'"

* * *

Horace Bolender looked up with irritation. There were days that he thought that someone should issue an ordinance against humming while wandering up and down the halls of the Department of Economic Resources.

Unfortunately, the person who would have to issue it was his boss, Tony Adducci, who was currently humming the "Folsom Prison Blues."

There were days when Horace thought that Tony must have the world's largest inventory of country music songs that either started or ended up with someone in prison for any one of a variety of offenses. If he heard "The Green, Green Grass of Home" just one more time, he thought he would freak out. Tony had been on a kick, repeating that one over and over, for the past several days.

Maybe "Folsom Prison Blues" wasn't so bad.

Tony smiled to himself once he was safely past Horace's door. He really shouldn't do it, but he'd been making a sort of collection of prison songs. Benny Pierce had been a big help.

September, 1634

Tony Adducci's well-intentioned letter had been chasing Noelle Murphy all over the map of Franconia. She paid the fee, wondering why it was so thick. When she came to open it, she realized that another letter was stuck to the back of it. Carefully, she separated the two.

Tony's letter was old news by now. But she was grateful that her godfather had thought of her. She had sent her mother a very careful letter when she first got the news, which was by way of a message that Ed Piazza had radioed down to Steve Salatto in Wuerzburg. Steve and his wife Anita Masaniello had given her a bare bones version of the events at Juliann Stull's funeral

because that was what they had.

It had been a very, very careful letter. Trying to say, "I love you a lot, Mom, but are you really sure about this?" Sounding more like an anxious parent than a child, she was afraid. What with the other three girls being left up-time and Keenan not being of much help about anything, she guessed that she was responsible now.

After all, under the will of God, she owed her very existence to the fact that her mom had no common sense at all when it came to Dennis Stull. And never did have. And probably never would have.

She hadn't known whether she should write anything to Dennis. Not at all. It was the kind of occasion when you missed printed greeting cards that had messages thought up by someone else. Finally, she had sent a little note wishing him a rapid recovery from his wound. That would have to do for the moment.

It wasn't as if she really knew him.

The second letter now, stuck to the one from Tony. She looked at it. Presumably, it had been stuck there since the day it left Grantville. The moisture in the glue on Tony's letter had completely blotted the address. She opened it, looking for some identification of sender or intended recipient.

Read through the contents. Smiled a blissful smile. Talk about a person digging his own grave. She reached for an envelope, dropped the item into it along with a cover note of her own, and sent it on its way back to Grantville and Tony.

* * *

"Jim's father, Duane Fritz, is my first cousin," Natalie Bellamy said. "His mother was Susan Bock. That was a bad idea. Bocks and Fritzes shouldn't marry each other. Both families have some little oddities. The Bocks more than the Fritzes, if I do say so myself. Laurene Bock, Mona Pennock's mother, who went out to California, was a little peculiar, too. Though nowhere near as much as Duane. As is Marjorie, Archie Mitchell's wife. The only branch of those Bocks that escaped it were the kids of Nancy, who married Phil Reardon. And I'm not so sure about Dude Reardon, either. Which would really mean that only Gary Reardon who married Gaylynn Murray is what a person might call not in any way dysfunctional."

"What's wrong with Jim?" Carol Koch asked.

"I can't give you a medical diagnosis. I'm not a psychologist or a psychiatrist. But just as a lay person with no more training than any teacher gets, I'd guess high-functioning autistic for both of them, Duane and Jim. Or Asperger's Syndrome. Somewhere in that area. Nothing that anyone in Grantville has the training to do anything about, or ever did."

She sighed. "Sometimes I'm not sure that I'm so different from them. People have been known to say that my social skills are lacking, even though I've been working on them for as long as I can remember."

"How do you mean that?" Carol asked.

"I could see patterns in math. That's why I liked it so much. But I couldn't see patterns in anything else, so none of the rest of what I studied in school ever made any sense to me. I survived in grade school and high school just by memorizing every single little individual fact and reciting it back to the teacher. Or recognizing it on true-false or multiple guess tests. But by the time I'd reached my junior year at WVU, I was just overwhelmed by it all. I was floundering and my grades were going down. So I went looking for a tutor for my humanities subjects. That's

where I met Arnold." She looked at Carol and Aura Lee a little defiantly.

"Nat, honey," Aura Lee said, "the guys can think anything they like about Arnold. As long as you like him, that's fine with us."

"It had better be," Natalie said.

Aura Lee grinned. The essential Nat, once more rising to the surface.

"You see, he didn't think like I do, but he understood how I think," Natalie said. And he gave me patterns for other things when he tutored me. He showed how for poetry, if I ignored what the poet was writing about, there were patterns there—rhythms, rhyme schemes. Structures underneath all the messiness on top. And that stories came in certain kinds, whatever their specific content was, so that it was a coming of age story, or a space opera, or—something. Something that let a person classify it. It was so great."

Carol just sat there. Math was her own field, but what Natalie was describing certainly wasn't the way her own mind worked, even in math. Her mind jumped, made intuitive leaps, connected things that didn't apparently belong together. It drove Ron nearly crazy, sometimes. She was absolutely sure that engineers and mathematicians didn't think alike. Maybe not even all math people thought alike.

"The only thing that he couldn't really help me with was history and social sciences, which was his own field," Natalie said. "That was sort of funny. But people as individuals just won't follow patterns. There can be some general patterns of how they behave—that's sociology—but no one individual will necessarily do what's expected. Something else crosses a person's mind and he goes off on some tangent. Even so, what he did show me was a lot of help. Enough for me to get a grip on my classes again. When I had 'having to remember ever single little detail' down to just one course or so every semester, that was manageable."

She stood up. "Anyway, that's why I suggested that they let Arnold take a look at this stuff. He sees patterns, too, but in a different way than people in math and statistics see them. Maybe there is some kind of other connection in this graft scheme, something that the rest of us have been missing."

* * *

"This letter that Noelle sent is very interesting," Carol said, "even though it's from way last spring. Combined with the fact that Jim Fritz was right in what he showed your brother. I wouldn't put it the way he did, but these orders from Franconia are, in fact, the 'wrong shape.' Way too much of some items as compared to any reasonable expectation of need. Even including the bypass project at Forchheim. Let me run some computations, since I still have a working computer."

"Thanks," Joe Stull said. "And thanks for the loan of your statistician, Tony, since Carol really belongs to your department rather than to mine."

"If the two of you don't mind," Carol said, "Natalie would like to talk to Arnold about this. She says that in a way she sees things in shapes and patterns almost the same way Jim Fritz does. That's why she went into math in the first place. The difference, of course, is that she can deal with people too, even if sometimes she's not the most tactful person on the planet, so she was able to go into teaching. But she says that Arnold sees things in a lot of different ways."

"I don't see why not, myself" Tony said. "But let us talk to Ed Piazza first, and go at it through the proper channels."

"Don't expect some kind of a magic bullet," Carol warned.

* * *

"I don't just want to get Horace," Ed Piazza said. "I want to get him for the scam. I want to make an example to end all examples. I want to throw the fear of God into anybody who is feeling tempted to go and do likewise. In other words, I'm not content with the equivalent of a mail fraud conviction. Go ahead and take Drachhausen down on the attempted rape charge. But for Horace and the Cunninghams, hold off. Let Carol finish the year or so we figured it would take to get to the bottom of it all. Have Gordon Fritz go on keeping his eyes open at the Grantville Research Center. Go on collecting data from Franconia and Erfurt. Continue collating it all together. We can afford to be patient for a while."

* * *

"Can you explain this 'patterning' to me?" Carol asked with some exasperation.

Arnold Bellamy looked a little frustrated. "It's seeing underneath what you see on the surface."

"Can you give me a concrete example of it. Something that I would understand?"

He twisted his pencil in his fingers for a few minutes. "In the spring of Natalie's junior year, I accompanied her to a program of the mathematics honor society on campus. You must understand that at the time, while I was getting my secondary certification, I had very little money, almost all of which came from tutoring. Natalie had suggested that if she mentioned to others how much I had assisted her and said that I was right there, I might find some additional pupils."

I just bet that's what Nat was thinking. Carol kept this opinion to herself.

"In any case," Arnold said, "she was standing at the end of the buffet table, looking like herself. That is, her hair should have been trimmed three weeks earlier, part of her dress was too loose, part of her dress was a little too tight, and while it was sensible of her to have worn winter boots with grip soles, considering the weather, all of the other women present were wearing heels."

"Quite recognizable," Carol said.

"The woman next to her was the wife of Professor Cornaro. She was generally considered to be an attractive woman. I began to ask myself why, and look for the underlying patterns. Finally, I decided that Mrs. Cornaro's configuration was designed to display clothing well. Her shoulders were comparatively broad, her body had few protrusions, and the proportions of the upper and lower torso did not interrupt the line of the fabric."

"I see." Carol was having some trouble maintaining an appropriately solemn face, but she managed.

"Then I looked at Natalie in more detail, and began to diagnose the structural pattern of her body that underlay the poor fit of the clothing she was wearing. I was making reasonably good progress on doing this when the cocktail hour ended and people sat down for the meal."

"Too bad the analysis had to be cut short," Carol cooed.

"I did, in fact, get three new people to tutor, so the evening worked out very well," Arnold continued. "But thereafter I found that I had increasing difficulty in maintaining a properly professional attitude when I worked with Natalie. Having, ah, once visualized her component parts."

"I'm sure you did your very best to maintain an appropriate detachment," Carol said deadpan. As a matter of fact, she *was* sure of it. Arnold being the kind of guy he was.

"The results of having done it once were occasionally seriously embarrassing. I found that I was continually tempted to repeat the process, although there was no real need for me to do so once I had the data. But that is the essential procedure I am trying to apply to this mass of economic data, for each section of the evidence," Arnold said. "To look at the surface and see whether or not it conforms to the substratum. If not, to determine what the contours of the substratum are."

* * *

"Honestly," Carol said to Ron that evening, "it had to be the most convoluted description of the process generally known as 'undressing her with his eyes' that I have ever heard in my life."

Ron Koch shouted with laughter. "We all know that the honorable Arnold Bellamy would never have been known to do such a thing. Of course we do."

"Having been known to do something is a different thing from having done it," Carol said. "That's what evidence is about."

February, 1635

Being patient might have worked. By the late winter of 1635, they were indeed very close to being able to spring the trap on Horace Bolender and his associates.

Except that Horace attempted to contest Fran's divorce suit and obtain custody of Dustin and Damien.

Which resulted in Fran calling Laura Jo and spilling the beans in regard to Horace and Dan having set up Sheryl with Drachhausen.

Upon which Laura Jo sent the younger children down to Kamsdorf to stay with Sheryl and called Preston Richards.

She didn't even try to bargain for a reduced sentence in exchange for turning state's evidence.

As Tony Adducci commented more than once, when you came right down to it, if country music didn't say it all, it said all that was necessary. And it dealt with people and their emotions and feelings. It was never about economic development scams any more than it was about Catholic canon law. He had found another clear exception to the principle that country music said it all.

And he still hadn't found a song that matched, "*Du, du, liegst mir im Herzen.*"

Part III: Full Faith and Credit

September, 1634

"The court will adjourn until one o'clock P.M." Judge Maurice Tito rose from the bench.

In the courtroom, an elderly man rose, pulling himself up by the handle bars of his walker. "Your Honor, may I have the privilege of speaking with you and the parties' attorneys in chambers before the court resumes its session? The matter concerns both a point of law and a point of fact which appear to me to be relevant to the case currently before the court."

Tito looked down. It was rare for Thomas Price Riddle, Esquire, to make such a request. The

frail father of Chief Justice Charles Riddle had been eighty years old when the Ring of Fire occurred. He was training most of Grantville's new lawyers, but he almost never took an active part in judicial proceedings. This morning he had attended in his capacity as mentor and shepherd to several of the students who were reading law under his guidance, to watch Laura Koudsi, the first of his students to complete her training from start to finish since the Ring of Fire, handle her first divorce case. There was no apparent reason for him to intervene in *Murphy v. Murphy*, so whatever concerned him must be urgent.

"Request granted, Mr. Riddle" he said briefly.

* * *

In the greater privacy of his chambers, he asked, "What's bothering you, Tom?"

"Some of this morning's testimony. In relation to other information in regard to the case that is general public knowledge. At least it is general public knowledge if a person has lived in Grantville long enough."

"In what way?"

"Do I have your permission to begin with something that may seem quite irrelevant at first?" Tom Riddle asked. "And that you all"—he included the two attorneys in his gesture—"bear with me for a while if I seem to be a maundering old man?"

"I've never heard you maunder, Tom, but I will certainly bear with you as long as you wish," Tito answered. He was all too well aware that his own background for the job he held was far less comprehensive in the way of legal education than that of Grantville's senior lawyer. Ten years on the Fairmont police force and teaching several courses in criminal justice to aspiring candidates for law enforcement jobs at the Tech Center did not equate to full preparation to handle civil cases and domestic issues. He relied heavily on digests and summaries.

As had Sheldon Francisco during the two previous years, before he moved to the State of Thuringia-Franconia's Department of Justice. Sheldon had taught a couple of courses in business law at the Tech Center before the Ring of Fire. Neither of them were lawyers. Just, in this world, judges.

Grantville's legal system was to a considerable extent a thing of baling wire and binder twine, duct tape and expedients. The town had not been the county seat. No courthouse. No associated personnel. At the time of the Ring of Fire, the town had exactly one practicing lawyer, Chuck Riddle. Mike Stearns had appointed him chief justice for the NUS, now the state. As such, he could not really provide guidance to the judges in Grantville's own court system, since the court over which he presided was the only avenue of appeal for the decisions its judges handed down.

Thomas Price Riddle, the intervener, was the chief justice's father. Martin Riddle, the prosecuting attorney, was his son. Martin had been in his third year of law school. The legal counsel to Ed Piazza, the president of the State of Thuringia-Franconia, was Chuck's daughter Mary Kathryn, who had been in her first year of law school. It was practically incestuous. It was also unavoidable until such time as Grantville produced more lawyers. With the result that Tom Riddle, aged eighty and already unwell, did his best to become a law school faculty. Which he had been doing, now, for four years. To a dozen or so students, most of whom had other full-time jobs, and who, half-trained or not, were subject to being called away for months at a time for such projects as the special commission sent to Franconia in 1633.

"As a younger man, as you know, I practiced law under the Uniform Code of Military Justice for some years."

The other three nodded. One of the additional obligations that Tom Riddle had assumed was presiding over some of the inevitable courts-martial that had occurred during the past four years. He had provided advice and counsel to the judges and attorneys alike during others.

"That is not directly relevant," Riddle continued, "except that those years of practice took me for quite some time to Fort Leavenworth, in Kansas. Occasionally to nearby installations, including the Rock Island Arsenal. I was in the Middle West long enough to become familiar with the legal systems prevailing there. These were not always the same as West Virginia law, by any means. And under the 'full faith and credit' provision . . ."

As the older man spoke, Maurice Tito's stomach cramped, clenched, and began to sink down toward his knees. He had a premonition that whatever came next was not going to be good. He nodded his head.

Laura Koudsi looked totally bewildered.

Johann Georg Hardegg looked totally apprehensive.

Riddle continued. "The newspaper coverage of the shooting at the Central Funeral Home during Juliann Stull's funeral in July included a statement by Patricia (Fitzgerald) Murphy to the effect that the first time Dennis Stull proposed to her was in 1965."

Tito nodded.

"You were not in Grantville in 1965. Your family lived in Fairmont, and if I recall correctly, you were about eight years old?"

"Yes," Tito said. "I turned eight in October of that year. Although at that time my family was living in Clarksburg. We didn't move to Fairmont until I was fourteen."

"My hypothesis applies, though. You have no family connections in Grantville other than those arising through the fact that you married Renee Warner. And in 1965, you were neither old enough nor in a position to be aware of most of what was happening in Grantville." Riddle leaned back in his chair.

"Perfectly true," Tito said.

"Attorney Hardegg, representing Francis Murphy, was certainly not in Grantville at the time, considering that he was born in 1598 in Saalfeld in the Duchy of Saxe-Altenburg."

Johann Georg Hardegg inclined his head.

"And," Tom Riddle smiled at his former student, "Laurie here would not be born for another thirteen years."

She blushed a little. She realized that she probably knew even less about the gossip that had been current in Grantville in 1964 and 1965 than Maurice Tito did. Her parents, in fact, were more or less the judge's contemporaries, and thus probably not fully conversant with the gossip of the time. Her father Simon was Tito's own age and her mother Dina wouldn't have been more than five or so.

"I haven't spent much time on 'full faith and credit' with my students," Thomas Price Riddle said. "I feel a little bad about this, Laura. You may end up feeling that I've really pulled the rug out from under you and your client. But, a small West Virginia town stuck in the middle of Germany in the 1630s—I really didn't anticipate that you and the other upcoming young lawyers would need it. I've been trying to concentrate on things you could reasonably expect to encounter, on the predictable. But this is neither expected nor something that I would have predicted. Therefore," Riddle continued, "there are a couple of things that the court may need to take into

consideration."

* * *

"Let's begin with some history," Tom Riddle said, looking at the three of them. "The starting point is that Pat Fitzgerald was absolutely crazy about Dennis Stull."

"That certainly seems to have been the case," Tito grinned.

"Her eighteenth birthday was December 29, 1964. On the morning of that day, she got out of bed, packed a suitcase, hitchhiked to Fairmont, and used nearly every cent she had saved from a part-time job to buy a ticket to Fort Leavenworth, Kansas, where Dennis Stull was stationed. What little money she had after that, she used to phone him long distance from Pittsburgh and say when she would arrive. Within a couple of days, this was general knowledge in Grantville. Given the way that her parents were ranting and raving, it would have been almost impossible for anyone to have missed it. I was practicing in Morgantown at the time, but my sisters Stella and Myra were still living in Grantville and I heard a lot about it. Hearsay, of course, but I believe substantive enough to justify having the court pose some questions to the plaintiff."

"We are now getting very close to the essential point?" Tito asked.

"Yes. To the best of my knowledge, Pat lived with Dennis Stull for well over a year that first time, for several months in Fort Leavenworth and subsequently, until he was sent to Vietnam, in Davenport, Iowa, while he was stationed at the Rock Island Arsenal. Both Kansas and Iowa are states that do recognize common-law marriage. Moreover, the law of Kansas worked on the theory that if it looked like a duck, walked like a duck, and quacked like a duck, it was jolly well a duck, even if thoughts wandering around inside its head might have been to the effect that it intended to be a pheasant. Numerous couples, over time, have been very surprised to discover that after a sojourn in Kansas they were now married. It may be prudent of the court to determine whether or not the plaintiff and defendant in *Murphy v. Murphy* were ever legally man and wife before issuing a divorce decree."

Maurice Tito's stomach turned a few somersaults, crunched up into knots, and refused to even think about consuming the cold cuts and cheese on rye sandwich he had brought for his lunch.

"Thank you," he said to Riddle. "I dismiss the attorneys to confer with their clients."

"You are quite welcome," the older man said, and left to join his little flock of baby lawyers at the Thuringen Gardens, to which they transported him by wheel chair.

Maurice Tito sat there, looking at his lunch pail. He finally decided to risk eating the apple.

Thinking, as he did so, that given its symbolism, it was a remarkably appropriate fruit for the occasion.

* * *

Johann Georg Hardegg, of the firm of Hardegg, Selfisch, and Krapp (with branches in Saalfeld, Rudolstadt, Jena, and most recently Grantville) had taken the task of representing Francis Xavier Murphy in this divorce suit. Not because he necessarily expected to be paid, given Murphy's reputation, but because it had seemed to be an uncomplicated case that would bring him a little more name recognition, and hopefully a few more clients, as the firm set up its new branch.

After all, he had been assured over and over, the up-time matrimonial law was nowhere near as complex as that of the German states in the 1630s. There were civil licenses to be obtained, a ceremony to be performed by a duly licensed civil or ecclesiastical authority, and the filing of the certificate. It was quite simple and forthright. On one given day, a couple was not married; on the

next, after those steps, they were. There were no legally binding betrothals to worry about; none of the difficulties that made practice before an *Ehegericht,* a consistorial marriage court, so wearisome in the Lutheran principalities.

He was feeling sadly disillusioned as he ate his ample lunch.

* * *

Thomas Price Riddle, upon returning from lunch, was separated from his students by the bailiff, who requested that he speak with the judge again.

* * *

"The court will now come to order," the bailiff intoned solemnly. "All rise."

Maurice Tito entered from his chambers and took his place on the bench.

"I have taken the liberty," he announced, "with the consent of the attorneys representing both parties, to request the presence of Thomas Price Riddle, Esquire, as my associate on the bench in the hearing of this case."

That caused a considerable rustle among those present in the court. Particularly the newspaper reporters, who regarded *Murphy v. Murphy* as a sufficiently luscious tabloid case even without new and unexpected developments.

Riddle, in robes, joined Tito.

Tito looked at Laura Koudsi and advised her that the court found itself in need of additional information and would wish to swear her client to testify for informational purposes.

Laurie looked at Pat. Pat said, "Okay by me."

"We have no objection, your honor," Laurie said, "although I, um, think that this isn't quite the way things are done usually. That is, I would like to state for the record that this isn't the way things are done usually."

Tito had no wish to be harsh with her. "We grant this is an exception to normal procedure," he stated. "An exception I am making for the reasons that were presented in chambers and will soon become apparent to the court for the record."

* * *

"What happened when I went out to live with Dennis?" Pat asked in some bewilderment. Laurie had tried to explain the legal points to her during the last half hour of the lunch break, but the only thing that had gotten through was that she might not be divorced from Francis today, which had caused an outburst of passionate sobbing. Once her attorney had dried her eyes and had her blow her nose, she had ended up more confused than ever by Laurie's attempts at further explanation.

"Yes, please," Maurice Tito stated. "Just a brief statement, please."

"Well, I left here—left Grantville that is—on my eighteenth birthday. The buses were really slow because of the weather. I missed a couple of transfers, so I didn't get into Leavenworth until New Year's Day. That was three days later. I got off. Dennis was there, waiting for me. He'd been there to meet every bus that came in for thirty-six hours. I couldn't call again and tell him where I was because I didn't have enough money and it wouldn't have done any good if I had because he was at the bus depot waiting for me."

"Continue, please," the judge said.

"I got off. We kissed each other for a while. Then we went to look for my suitcase, but it hadn't come in on the same bus. Before we went to ask about it, Dennis said that he wasn't going

to have anyone looking at me crossways. He took a box out of his pocket and it had a wedding and engagement ring in it. Just dime store, but he put them on, and said that we could sort out the rest of it later, but I should wear them. After that, we kissed each other a little more. Then we went to the baggage office."

Maurice Tito's stomach was performing multiple gymnastic stunts. He was seriously wishing that he had not eaten even the apple.

Thomas Price Riddle's face was totally impassive.

"Continue, please," Maurice Tito said.

Pat took a deep breath. "The man at the depot said he would call when my suitcase arrived. Dennis gave his number at the barracks, but a different address, because when I said I was coming, he had subleased a little apartment from a guy who was being transferred out on short notice. Then we went to the car he had borrowed, and stopped at a drug store so I could get a toothbrush and stuff, which he had to pay for because I didn't have any more money, and we went to the apartment. We got out of the car. The apartment was up above a garage. Dennis knocked on the kitchen door of the house and introduced me to the landlady, who gave me a second key. Then he went to return the car to the guy he had borrowed it from while I took a bath."

"How did he introduce you to the landlady," Thomas Price Riddle asked.

"As his wife. Well, I mean, he could hardly have said that I was his squeeze or whatever they called it back then. She was a very respectable-looking woman," Pat said.

"Thank you," Maurice Tito said once more. Then, "How long did you continue living in this apartment?"

"Until July. Dennis was real busy, of course. There wasn't any point in sitting around by myself in the apartment all day, every day. I thought about getting a job, but he said that he was able to cover the rent and it would be better, since I'd left Grantville in the middle of the school year, to go back to high school there and finish up. There were so many military families in Leavenworth that the school system was fairly accommodating. They got my transcripts in a hurry, tested me in for placement, and turned me out in June with a GED high school diploma. That was a whole year faster than I'd have been able to do it here."

Thomas Price Riddle intervened once more. "Do you still have a copy of this diploma?"

Pat nodded.

The court reporter reminded her to reply verbally.

She said, "Yes. It's over at the house, somewhere, I think. I kept it in a safe deposit box for a long time, but since I moved back to Grantville from Fairmont, I haven't bothered to rent one. It's probably in the bottom drawer of the hutch in the breakfast nook, with the kids' birth certificates and report cards and things."

"Do you recall the name in which this diploma was issued?" Thomas Price Riddle asked.

The tone of his voice was very cautious.

"Patricia Fitzgerald Stull. That was how I was enrolled. Dennis and I were supposed to be married, after all."

The two men on the bench looked at one another. Maurice Tito raised an eyebrow. Riddle nodded slightly.

"You say that you lived in Leavenworth, Kansas, until July of 1965?"

"Yes," Pat said.

"What happened in July?"

"Dennis was transferred to the Rock Island Arsenal, so we moved. We knew that he was going to be transferred before I finished school, so I didn't bother to look for a job for such a short time. After that, we lived in Davenport, Iowa, until Dennis was sent to Viet Nam. We had an apartment there, too."

"When was Mr. Stull sent to Viet Nam?"

"August, 1966."

"So you lived in Davenport, Iowa, for thirteen months?"

Pat nodded, and was once more reminded by the clerk to make her responses verbal.

"During this period," Riddle asked, "did you represent yourselves as husband and wife?"

"Oh, yeah. Since we knew it would be more than a year, we signed a regular lease on the apartment. Dennis Stull and Patricia Stull. Dennis was absolutely determined that nobody was going to think that I was a light woman or anything. I mean, we wanted to be married, even though we were stuck over whether to have a Catholic ceremony or not. Then when he shipped out, I came back and got a job in Fairmont and then my parents started driving me absolutely nuts."

This time Thomas Price Riddle raised an eyebrow and Maurice Tito nodded.

"The court declares a recess," he stated. "The court will reconvene at eight o'clock in the morning. The attorneys representing each party to the divorce suit will please appear in the judge's chambers at four o'clock this afternoon."

* * *

"There's no doubt about it," Thomas Price Riddle said. "Oh my yes, under Kansas law in 1965 they absolutely, positively were married. Public representation, living together, and a legal document attesting to it. Done deal. Oh yes. True in Kansas at the date of the Ring of Fire as well. Married. Dennis Stull and Patricia Fitzgerald were solidly, legally, bindingly, 'it takes a divorce court to end it' married."

"And Iowa?" Tito asked.

"Under Iowa law, also, they would need to get a divorce, signed and sealed at court, before either of them could legally marry someone else. That was, and is, a full-fledged common-law marriage. They're married. Dennis and Pat, that is. Not Francis and Pat."

"It isn't something that I'd expected," Tito commented.

* * *

Tito and Riddle broke the news to the two attorneys, under strict orders to make no statements to the press or to speak of the matter to anyone other than their clients.

The attorneys broke the news to their clients. They omitted to warn their clients not to make statements to the press or to others. This level of communication had, unfortunately, slipped the minds of both judges.

Francis Xavier Murphy went back to jail, where he told everyone within hearing, including his son Keenan, who came by to see him fairly regularly.

Keenan went to the 250 Club and got thoroughly drunk, telling everyone there and saying that it only made sense, in a way, considering that everybody in town thought that he himself was a thorough bastard anyway and Noelle was not, that their legal status should be matched up to the way they acted.

Some subsequent comments by various patrons resulted in a police visit to the premises.

Pat went to the telegraph office and sent off a telegraph to Dennis in Erfurt asking him to please come back to Grantville as soon as possible. And explaining why. She dictated it right in the presence of everyone else with business there.

Grantville being Grantville, the news spread rather rapidly. The only people no one phoned, as it circulated, were Maurice Tito and Thomas Price Riddle. They were consequently rather surprised the next morning to observe just how full the courtroom was. Not to mention the corridor, the staircase, and any number of people milling around in the vestibule.

* * *

Maurice Tito stayed up all night writing the statement he read from the bench. He sent Thomas Price Riddle home at nine in the evening on the grounds that his continued health and well-being were of more importance to Grantville's long-term welfare than any one legal case.

He adduced carefully the reasons for the decision he was taking.

He dismissed *Murphy v. Murphy* on the grounds that Patricia (Fitzgerald) Stull, not being married to Francis Xavier Murphy from the perspective of civil law, had no need to divorce him.

Pat started to smile.

Laurie Koudsi requested that if he was going to dismiss the divorce suit, would he please enter a decree to the effect that the marriage of Francis Murphy and Patricia Fitzgerald was null.

Maurice Tito entered the finding. That the marriage was null on the grounds that it was bigamous.

Francis Murphy made his unhappiness with this finding known. Loudly. His attorney attempted to quiet him.

That was the point at which Dennis Stull arrived from Erfurt and was escorted into the courtroom by the bailiff.

Followed by Pat opening a little box that was suspended around her neck by a chain and bringing out the dime-store rings from 1965, which he promptly put back on the third finger of her left hand.

At which point Francis Xavier Murphy, pushed once more beyond the limits of what he was capable of enduring, jumped up and screeched, "Do you mean that you were wearing that man's rings around your neck all the time we were married, you whore? I thought it was some kind of religious medal."

Things deteriorated from that point. From the perspective of everyone except the reporters, that is.

"All in all," Maurice Tito said to his wife Renee that evening, "it's been an interesting day. Which is not the kind of day a judge wants to have in his courtroom, as a rule."

Part IV: Ehegericht

September, 1634

"All in all," Maurice Tito said to his wife Renee that evening, "it was an interesting day. Which is not the kind of day a judge wants to have in his courtroom, as a rule. It certainly wasn't

what I expected when I set out for work yesterday morning, expecting to issue Pat a divorce decree from Francis Murphy. Probably the only ameliorating aspect of the situation is that he is still locked up, awaiting trial for the shooting at Central Funeral Home and related charges. Plus, now, new charges in regard to attempted assault with intent to kill with his bare hands while in a courtroom. Not that I don't have a certain limited amount of personal sympathy for the man, in the sense that it can't be easy to discover that over the years you thought you were married to a woman, during which she bore you four children, she was wearing another man's rings in a little box suspended on a chain around her neck."

"Do you know what Aunt Mildred says?" Renee asked. "Aside from the fact that Pat Fitzgerald was just never the most 'together' girl born in Grantville, West Virginia."

Maurice shook his head.

"She says that at the time, the gossip went . . ."

Maurice shook his head disbelievingly. Not disbelief that Renee's Aunt Mildred knew all the gossip. Mildred Barnes was the ultimate Grantviller, in a way. Her older son Warner was in the USE State Department now, and an officious, pencil-pushing bureaucrat unmatched in the administration. Her younger son Pelton was director of Grantville's Public Works Department. Pelton's wife taught first grade. And Mildred's daughter Amber Lee, now married to Sterling Pridmore, was, to say the least, well placed to have a significant interest in the enthralling soap opera surrounding the three-way matrimonial difficulties of Francis Murphy, Pat Fitzgerald, and Dennis Stull, being currently Dennis' executive assistant at the Erfurt Supply Depot.

Renee wasn't badly placed for picking up gossip herself, being a guidance counselor at the high school. Plus, there was the added dimension that unlike Mildred and the rest of the Warners, Renee and her sister Janet had ties into St. Mary's parish. Their mother, like Maurice himself, had been from out of town. She had also been Catholic. William and Gail Warner had been left up-time, retired and not yet back from their annual snowbird stint in Florida when the Ring of Fire hit.

Maurice, as an outsider, sometimes worried about the amount of nepotism that Grantville had brought to the administration of Thuringia and Franconia during the years 1631 through 1634. Not to mention to its administration of itself, so to speak. Not that they could have avoided it and still gotten anything done, in a town where families had been intermarrying for generations. Plus, the down-timers regarded it all as perfectly natural, since that was the way seventeenth century Germans did things, too, many of their towns being about the same size and marked by the same kind of multigenerational interrelationships.

Renee was chattering on. "Aunt Mildred says that they were all talking about it when it happened. Pat's sisters were left up-time, except for Suzanne Trelli, who's too young to have known, probably. She would only have been eleven or twelve when Pat and Francis got married. But Francis' sisters, Mag Farrell and Pauline Mora, are still right here in town. And his brother Andy. And so is Pat's mother. If anybody tries to prosecute Pat for bigamy at this late date, at least one of them will probably spill the beans."

She paused.

"Maybe it's not entirely proper legal procedure for me to clue you in, Mr. Judge. But there are just some things you need to know if you're going to make this jerry-built, winging-it, seat-of-your-pants administrative system run by a batch of under qualified, overstretched hillbillies that we're building work. Besides, if you had been born here, you'd know this stuff already, just by being alive."

"One of the books I was studying," Maurice pointed out, "said that the original idea of a 'jury of your peers' was not a jury of perfect strangers with no opinion on the case in advance, the way lawyers wanted jurors up-time, but rather a jury of your neighbors who could be expected to know something about the matter. In a way, I think, we're sort of shifting back to that idea. Getting the best information we can. The relevant stuff, no matter how it comes up."

* * *

"Bernadette headed straight over to St. Mary's," Tony Adducci said to his wife Denise. Denise was Pat Fitzgerald's first cousin, so she had a natural interest in all of this, considering that it was she and Tony's sister Bernadette who had bullied Pat into showing up at the visitation for Dennis' mother in the first place. Which had triggered the subsequent events when Francis tried to shoot her. "To let the Jesuits know about common-law marriage in Kansas and Iowa. I expect that at least one of them will shortly be descending on Tom Riddle for a briefing on the significance of 'full faith and credit' under the U.S. Constitution. The up-time one, that is."

"I'm going to talk to Mom and Dad," Denise said. "I'm not old enough to remember. I was only six at the time. But they must have known what Uncle Patrick and Aunt Mary Liz had in their heads back in 1968 when they pushed Pat into marrying Francis Murphy. There's just no way it would be fair for someone to prosecute her for bigamy after all these years, especially when she didn't have the vaguest idea that she was common-law married to Dennis."

"Ignorance of the law is no excuse."

"Well," Denise said, "sometimes it should be. Believe me, if Pat had the slightest idea that she was married to Dennis during all those years, she'd have spent them sitting in his lap."

October, 1634

"What is it likely to mean for Pat and Dennis?" Joe Stull asked.

"It's going to make things hellishly complicated, I think," Tony said. "I don't pretend to understand it all. For one thing, even though the common law marriage was—still is, for that matter—a legally binding civil marriage, it wasn't canonically binding on Pat, I'm pretty sure, since a Catholic can't—couldn't—well, could in the sense of being physically able to do it and could in the sense that it was legal under civil law but couldn't in the sense of having it recognized by the church-marry a non-Catholic in a non-Catholic ceremony."

"Ouch," Joe said. "Could you stop right there and draw a diagram of that?"

"No. I told you already that I don't really understand it," Tony said. "But still, I think that after a civil marriage, the church would have required her to get a civil divorce before she would be free to enter a Catholic marriage. I'm pretty sure of that. It wouldn't have just ignored the fact that she was married to Dennis, even if she didn't know that she was. I think."

"You think," Joe said.

"That's what I said. I think. That's my position and I'm sticking to it." Tony chewed on his mustache for a minute. "I don't know of any up-timer at St. Mary's who might really understand it all except Larry Mazzare, and he's still in Italy."

"Are Pat and Dennis married?"

"Yeah. Again, I think. At least if the NUS Constitution as we altered it to become the Constitution of the State of Thuringia-Franconia took over 'full faith and credit.' Somebody better

take a look and see about that. If you want my advice, Dennis and Pat had better get a lawyer with more experience than Laura Koudsi and have the lawyer take a look and see about that. But I think they would still be married, because they would have been before the Ring of Fire."

"There aren't any lawyers with more experience than Laura Koudsi. She and Mary Kathryn Riddle are the first full-fledged new lawyers the system has hatched for us. Sort of full-fledged. Their pin feathers are starting to sprout, at least. Anyway, Mary Kathryn is working for Ed Piazza as legal counsel. Not to mention that she's the daughter of the chief justice and the granddaughter of the gray eminence who is mentoring our two non-lawyer other judges and educating all the rest of the upcoming baby lawyers to the best of his ability. Plus, she's the sister of the prosecuting attorney. It's practically incestuous."

"Is Pat a bigamist?"

Tony shifted uncomfortably. "Until the court issues some kind of a decision, probably God only knows. And I mean that literally. So it sort of depends on your view of God. Whether He's more into wrath or more into mercy. At least, that's the way the spirits are dividing at St. Mary Magdalene's these days. I'm sure you can guess what Tino Nobili thinks."

* * *

"I think," Bernadette said firmly, "that you had better hold a hearing. At least get the testimony down in black and white, while it's as fresh as possible in everyone's mind. If you want to wait until Larry Mazzare gets back to do anything about it, that's one thing. But the least you owe him is to get all the ducks in a row in advance. In my humble opinion, of course."

Father Athanasius Kircher looked at the opinionated middle-aged woman who might possibly, depending on how things worked out, become the most influential mother superior in the German church one of these years. If she got the new women's religious order she was proposing off the ground. That, too, was waiting for Larry Mazzare to get back from Italy. *In her humble opinion. Hah.*

"I'll consult with the others," he said. There were a half-dozen down-time Jesuits in residence at St. Mary's parish these days.

"Take a hard look at consent," Bernadette said. "Have Hanni Heinzerling look around in the storage rooms and attics to see if she can find the applicable edition of canon law. The parish should have had a copy back in 1968. From everything I've picked up, it's entirely possible that when Pat married Francis, she wasn't capable of rendering informed consent. I was only twelve or so at the time, but Mom and Dad say . . ."

"My," Kircher said at the end of her story. "That's astonishing, if true. And the canon lawyers will be fascinated, because it will, indeed, revolve around the consent issue. Well, in essence, marriage questions almost always do. It's too bad that in the absence of a bishop, Thuringia doesn't have a properly constituted *Ehegericht*. There's nobody who can establish a marriage court. Administratively, we are still in a mess with Larry Mazzare being a cardinal but not, as far as we can tell, a bishop. There's just no clear jurisdictional chain of command between St. Mary's parish and, well, the pope himself. And it's not much better in Franconia, with Hatzfeld in exile still. There's only so much that a suffragan can do."

January, 1635

Francis Xavier Murphy himself refused to testify in the matter. The fact that his lawyer,

Johann Francis Hardegg, was a Lutheran complicated his appearance before a Catholic canonical hearing quite a bit. Hardegg just kept getting up and repeating, "My client is not obliged to testify. This hearing is a purely ecclesiastical matter and the laws of the state do not require him to participate against his will."

This was most certainly true.

* * *

Dennis Stull also refused to testify in the matter, on the grounds that he was a Methodist, that Judge Tito said that he was married to Pat, she was wearing his rings again, and as far as he was concerned any more, that was the end of it. If someone charged her with bigamy, he added, he would spring her from jail and elope somewhere that was out of the local jurisdiction. All they needed to do was find someone to hold a wedding for them to make it feel a little more real.

Although he didn't say so, he thought, "and to make the rest of the Grantville women in Erfurt a little nicer to her when she moves up there with me, too."

* * *

"I think," Pastor Ludwig Kastenmayer said to Justus Jonas Muselius, "that as peculiar as it may seem, I had better be present at this Catholic marriage hearing. Just as a spectator, of course."

Kastenmayer had been to consult with the Lutheran theological faculty at the University of Jena numerous times in regard to the question of whether a spouse left up-time by the Ring of Fire should be adjudged to be legally dead, thus freeing the other spouse, the one transported to Thuringia in 1631, to remarry. His tact in bringing forth the case of Roland Worley as a stalking horse for the upcoming case of Gary Lambert had been sincerely appreciated by the ecclesiastical hard hitters of Thuringia.

Since his treatise on the matrimonial difficulties of Wesley Jenkins and Clara Bachmeierin had also been well received in academic circles, Count Ludwig Guenther was planning to appoint him to the Lutheran *Ehegericht* for the county of Schwarzburg-Rudolstadt. With special expertise in conflicts of matrimonial law between up-time and down-time statutes.

All of which led to Kastenmayer's next statement. "The more I can learn of the up-timers' practices and expectations, the better, I suppose."

"It will take several days," Jonas pointed out. "It's not as if you don't have other things to do."

"I know," the pastor said regretfully. "Given the size of St. Martin's in the Fields parish, even with the opening of St. Thomas the Apostle on the Badenburg side, I should by rights have two junior pastors to assist me by now. But with war levies, the count's budget is in enough trouble without increasing appropriations to the consistory. It's a case of 'needs must,' I suppose."

* * *

"How old were you at the time of your attempted marriage to Francis Xavier Murphy?" Nicholas Smithson, S.J. asked. This was by no means his area of expertise, but the other Jesuits at St. Mary's had designated him to ask the questions because English, albeit seventeenth-century English, was his native language.

"I was twenty-one," Pat answered. "I was twenty-one on December 29, 1967, and we married the next March. So I was of age by anyone's definition. Under up-time law, I'd been of age since I was eighteen. That's why I was able to leave home and go live with Dennis at Leavenworth and my parents couldn't stop me."

Laura Koudsi anxiously signaled to her, a sign that meant *Just answer the question. Don't*

volunteer information. Sometimes Laurie thought that Pat was her own worst enemy.

Smithson looked at Ms. Koudsi a little nervously. It was his first experience with a female lawyer present at a hearing in regard to matrimonial causes. She upset him a bit just by being present.

Not as much as having a Lutheran lawyer there did, though. Ms. Koudsi was at least Catholic.

He pulled himself back to the list of questions.

* * *

"I didn't want to marry Francis," Pat said. "I never wanted to marry Francis. I told my parents so. I told Father O'Malley so. Dad and Father O'Malley are dead, but you can ask my mother. She's here in town. You can ask Francis' sisters. You can ask my friends."

They did, of course. Jesuits were nothing if not thorough.

The affiants were in unanimous agreement that Pat had not wanted to marry Francis Murphy. "Even though," her mother appended, "it was clearly her duty to do so."

"Actually," Pauline Mora, Francis' younger sister, added to her testimony, "I don't think that Francis was wild about marrying Pat, either."

Upon being questioned, Andy Murphy and Mag Farrell, Francis' older brother and sister, expressed the same opinion.

Andy said he was afraid it was partly his fault. He was the oldest, he was the only other boy, and he hadn't been showing any sign of getting married then. Hell, he hadn't even met JoAnn. And his parents were getting awfully anxious that they'd never have a grandson to carry on the name.

Maggie Murphy, Francis' mother, testified that she and her late husband had "nagged" Francis into getting married because they didn't want him sent off to Viet Nam and maybe getting killed without leaving a child behind. In her view, Francis didn't have any objection to marrying Pat Fitzgerald, particularly. He didn't especially prefer her to any other girl, but he didn't object.

"And after all," Maggie said, "after the way she had behaved, running off to live with Dennis Stull, Pat should have been grateful that any good Irish Catholic man was willing to take her, whether she wanted him or not. That's what her parents kept telling her."

"Were you ever present when she replied to her parents after they said that to her?" Nicholas Smithson, the English Jesuit, asked.

"Yeah," Maggie said. "She said that she didn't need anyone to take her out of pity. That she could just wait for Dennis Stull to come home. She was pretty stubborn about that no matter how Patrick and Mary Liz browbeat her."

"I thought," Smithson said, "that Stull did return from Viet Nam before this purported marriage was solemnized."

"He did," Maggie said. "He got discharged and by February he was working in Clarksburg. And Pat went over there and saw him at least twice that I know of. If not more. That was even after Father O'Malley had already scheduled the wedding. Pat was being really contrary about the whole business. She wouldn't go to pre-Cana or anything. She kept insisting that she wasn't going to marry Francis."

Athanasius Kircher sighed. Those visits to Stull were new information. It would have to be investigated. Even though Stull refused to participate in the hearing.

* * *

"It wouldn't have happened," Pat said, "if I hadn't been so upset. I had a job in Fairmont and I was taking college classes part time, waiting for Dennis to get back. Then this whole thing blew up. It wasn't right after I came home. Dennis shipped out in September of '66 and I came home from Davenport—well, I came to Fairmont, not to Grantville—and got a job and started college part time at Fairmont State. That was when I took off Dennis' rings and put them in the box on a chain around my neck, because people around here knew for sure that we'd never gotten married and they'd have thought I was crazy to have them on. But I did keep on wearing them that way."

"Was the marriage to Francis Murphy already projected at the time of your return?" Smithson asked.

"Mom and Dad and Father O'Malley and Paul and Maggie Murphy didn't start nagging me to marry Francis until right around Thanksgiving in '67, more than a year later. From that point on, they kept at me and kept at me. They were just determined that I was going to marry Francis. I thought that if I could stave them off until Dennis got back and got his discharge, I'd be okay. That was going to be in January. I was so upset about it all that I lost my job right after Christmas. I messed up a few sales and the store let me go. I'd just paid my tuition for my classes for the second semester, so I was short on cash. I didn't have any money to pay my rent unless I was working. I tried for a short-term loan from the student credit union, but something hung it up."

"How is this relevant?" Smithson asked.

"I needed a place to live. Dad wouldn't loan me any money. He said that I had to come back and live at home. So I did, the end of December, when my rent ran out in Fairmont."

"You state that you 'thought you would be okay' when Mr. Stull returned. What happened?"

"A month before Dennis got out, Mom and Dad put an announcement in the paper that Francis and I were engaged, with a March wedding date. All sorts of people sent it to Dennis. Dozens of them, I think. Grantville being Grantville. As far as he knew, I was waiting for him. He was having a lot of problems anyway, just back from Viet Nam and several mess-ups with his paperwork so he was under a lot of stress. I wanted to spare him, so I hadn't told him what they were doing, pushing me to marry Francis, so it was a terrible shock to him. You can't blame Dennis for being real mad when he got back. I tried and tried to tell him that I was saying no, but we fought. He couldn't believe that they would have done that—published the announcement—unless I agreed to it. The last time that I drove over to Clarksburg to see him, we fought just terribly."

"How many times did you see Dennis Stull between his return from the army and the solemnization of your purported marriage to Francis Murphy?"

"Five or six, I think. I'm not exactly sure. He'd found a job in Clarksburg and was sharing a trailer on the job site with a bunch of other guys. It wasn't very private in that trailer, if that's what you're wondering."

Pat looked up. "You may not know enough about how things worked in West Virginia to ask me this next thing, so I'll tell you. I didn't go and apply for the marriage license, believe it or not. I don't know how they got it, but I know for certain that I never went to the courthouse with Francis to get one."

Laura Koudsi jumped a little. This was news to her. More and more, she was thinking that she would dearly love to have Francis Murphy under cross examination.

She looked across the room. Johann Georg Hardegg was taking extensive notes as he sat next

to Murphy. Murphy turned his head and said something to his attorney. Hardegg motioned, requesting Smithson's attention.

"Yes?"

"My client wishes to state for the record that he did not go to apply for the marriage license, either. When Father O'Malley picked up the ones for St. Vincent de Paul parish for that week at the courthouse in Fairmont, he told the clerk that the stack was missing the one for Francis and Pat. He picked them up every week, of course. And it had been in the paper. So the clerk filled one out according to the information that Father O'Malley gave her and sent it back to Grantville with him. My client states that nobody should blame the clerk, because she probably just thought that he and Patricia Fitzgerald had appeared and applied and that the original had been temporarily misplaced somewhere. Especially since the clerk was his Aunt Bridget, who still lives here in town, and he doesn't want her to get in any trouble."

* * *

That brought the hearing to a halt for a while. On the following day, Bridget Mary Scanlon Jenkins appeared and confirmed Francis Murphy's statement. Then the questioning of Pat resumed.

* * *

"Do you have any other testimony to offer in regard to the period prior to the marriage?"

Pat shook her head at Smithson; the clerk reminded her to give a verbal reply.

"No."

"Then please describe the actual marriage itself, to the best of your ability."

Pat looked straight at him. "The morning I was supposed to marry Francis according to the announcement that Mom and Dad had put in the paper, I went downstairs and said one final time that I wasn't going to do it. That I was getting in the car and driving to Fairmont and going to class, just like I did every other day. Mom said that I was hysterical and at least needed to drink some orange juice or I'd get low blood sugar and have a wreck on Route 250. She handed it to me. I don't really remember the wedding. I don't remember anything until the next morning, when I woke up feeling half dead with my mouth all sour and my head aching and was in bed with Francis in a motel and all sticky down there. So I figured that it was too late."

Laura Koudsi motioned for Smithson's attention. "Before my client concludes her testimony, I would like to submit a list of witnesses who have agreed to testify in regard to Patricia Fitzgerald's physical and mental condition on the day of her purported marriage to Francis Murphy. I would also like permission to call two expert witnesses who have consented to provide technical information in regard to the effect of a class of widely available up-time drugs called 'tranquilizers' on the individual to whom they are administered. I also request that you postpone the conclusion of my client's testimony until after the above material has been entered into your record."

Father Kircher agreed and adjourned the hearing until such time as the additional witnesses could be scheduled to appear before it.

* * *

"My name is Suzanne Fitzgerald Trelli. I am the youngest sister of Patricia Fitzgerald. In March of 1968, I was twelve years old. I don't know whether that's old enough for you to take my word in a court or not, but I'll tell you what I remember.

"Pat's the oldest. Little Mary Liz, the next sister after Pat, was nineteen then. She graduated

from high school that spring, joined the navy, and never came back. There was just a year between Mary Liz and Cathy, our next sister. She was eighteen then, so she was of age, and she left with Mary Liz. The navy wouldn't take her because she didn't have a diploma, so she worked for a while in Norfolk, got her GED, and then went on working at the shipyard. They both got married, later on. They have kids and lived down on the coast somewhere, in North Carolina. The next was our only brother. He was seventeen then. He was killed in Viet Nam in 1970. Not married, no kids. That almost killed our parents when it happened. Then Colette. She married Ed Piazza's brother Mark in 1978 and they moved out to California.

"Then me, I'm the last. When I was eighteen, I moved in with my uncle and aunt, Denise Adducci's parents. They helped me to go to college at Fairmont State just as if I was one of their own kids. I'm married to Felix Trelli who does placement for the Tech Center and I'm the language arts and remedial English specialist there.

"We have three children. Mary Suzanne, named for Felix's mom and for me; Patricia Beth, for my sisters Pat and Little Mary Liz who were like mothers to me for a lot of my life, and John Felix, for Felix's dad Giovanni and for Felix. That's 'Mary' in 'Mary Suzanne' for Felix's mother, not for mine. I'd rather have used her middle name, but she doesn't go by it.

"During those years that I was a kid, our mother was mostly checked out on prescription tranquilizers. It was Mom's own Valium prescription she used to give the pills to Pat the day they wanted her to marry Francis.

"I didn't go to the wedding. It was a weekday and I was in school. All I can tell you is what my sisters Little Mary Liz and Cathy told me later. They said that Pat was so zonked out that she couldn't even repeat the vows after Father O'Malley."

* * *

Pastor Ludwig Kastenmayer, sitting in the spectator's section, thought to himself that Frau Trelli's testimony was more remarkable for what it did not say than for what it did. Had he been one of the panelists taking testimony, he would have posed several follow-up questions.

* * *

Dennis Fitzgerald and his wife Rosemary, the parents of Tony Adducci's wife Denise and uncle and aunt of Pat, testified that they had not been invited to the wedding. "They told us that it was going to be very small and private," Rosemary stated.

* * *

"I wasn't there," Francis' brother Andy Murphy said. "I was working up in Pennsylvania back then, didn't have a car, and didn't have the money to come anyhow. It was a weekday, so I'd have had to take off and been docked my wages, too."

"I wasn't there, either," Mag Farrell, Francis' sister, said. "I was in the hospital in Fairmont having another miscarriage. I had three before we finally had Bobbi Jo."

"I did go," Pauline Mora, Francis' younger sister, testified. "I was born in 1947 and I was twenty, so I was of age. And from what I saw, Little Mary Liz and Cathy were telling Suzanne the truth. Pat was totally out of it that day. Wobbling on her feet."

* * *

"At least," Tony Adducci said to Joe Stull three days later, "it's looking more and more like Pat isn't guilty of bigamy. In the sense that her marriage to Francis wasn't good. This testimony that Kircher is taking is only for the purposes of determining canonical validity, of course. In the Catholic church. Not whether the marriage was legal in civil law. But since she says that she had

no intention of marrying Francis no matter what her dad and Father O'Malley wanted her to do and that she doesn't remember anything between breakfast before the ceremony and waking up the next morning, the purported marriage probably wasn't legal under civil law, either.

"What did O'Malley think he was up to?" Joe asked. "I'm really not following this."

Tony frowned. "I was only six when all this was going on about Pat and Francis' marriage. I was older when they separated, of course; a teenager, so I remember that. Ignatius O'Malley had his own version of the Catholic hierarchy. Irish on top. Followed in no special order by Germans, Italians, Poles, Slovaks, and Lebanese. Or maybe in about that order, now that I think about it. He wasn't so irrational about the other ethnicities, but he really did think he was obliged to make the Irish Catholic families in St. Vincent's parish toe the line. And one thing he could really hardly stand was the girls marrying out of the church. So every action that Pat had taken since she was eighteen was a total offense to him. He'd have done almost anything to get her back under proper control, as he saw it, I think."

"So you think she's free and clear?" That was what concerned Joe the most.

"She didn't consent. I don't see how any judge or jury, canon law or civil law, could find that she was capable of consent. I just don't. On top of everything else, when they called Pat's mother—Mary Liz—to testify, she admitted that she tranked Pat with Valium in her orange juice at breakfast, 'because otherwise she'd have been out of there when it came to the crunch and then running back to that Stull man over in Clarksburg.' Another valium in a glass of water before they took her to the church. And two more before they sent her off with Francis for the 'wedding night.' Which, according to the old harridan, she did out of 'mercy' so Pat wouldn't 'fight it and maybe get hurt.'"

* * *

"The informal hearing in regard to the matrimonial cause between Francis Murphy and Patricia Fitzgerald is resumed," Father Athanasius Kircher announced. He gestured to Nicholas Smithson to resume the questioning.

Laura Koudsi motioned. "My client would like to present her concluding testimony as a statement, rather than as answers to specific questions. Naturally, if you have specific questions at the end of her statement, she will attempt to reply to the best of her ability."

"Agreed," Smithson said.

Pat clasped her hands in her lap. "If I'd known that I was married to Dennis, even outside of the church, I'd have run to him even then and begged him to take me back even though I'd been unfaithful to him with Francis in that motel. I would have. But I didn't know it. I'd never heard of that 'common law' stuff. I don't think that West Virginia had it. I thought I was married to Francis. Catholic married, so that I couldn't even divorce him. So I went to him down in South Carolina after I finished the spring semester. Francis wasn't so unreasonable then. He agreed that I shouldn't waste the tuition money; that I should finish up the semester. When I came back after he shipped out, I was pregnant with Keenan. He—Francis, that is—wasn't killed in Viet Nam after all that. He came back just fine. Well, just fine in the sense that he was alive and not injured. Mentally, he was pretty upset. It was my brother who got killed.

"I never prayed for Francis to be killed. I never even prayed for the Viet Cong to take him prisoner. I did pray that he'd stay away and I didn't go to him again after he got back stateside. But after three years the army discharged him, the VA hospital said he was all right, and he came back to Grantville. That was where Maggy, Pauly, and Patty came from.

"By the time Patty was born, he was drinking terrible. He'd lost two jobs, already. But Father O'Malley was still the priest at St. Vincent de Paul, and he said that for a man to drink was no justification for a wife to leave him. That she had to be patient. So I stayed until the night that he came home drunk, picked up Patty, and dropped her on the floor. Not threw her. He wasn't what they called abusive. Just dropped her because he was so drunk. Then I just walked out. I took the girls. I should have taken Keenan, but I knew I couldn't handle him and work a full-time job, too. Sometimes you just do what you can instead of what you should."

She looked up at Nicholas Smithson, then at the bank of other Jesuits sitting at the table. By this time, she was circling her hands around and around one another nervously.

"It seems like, now, that all my life, everything that has gone wrong was because I was trying to do what I'd been taught was right. And every time I've confessed, I've confessed the wrong things, so I've been in a state of mortal sin every time I went to communion. I don't see any way to fix any of it, after all this time.

"I don't want anybody hurt more. All I want now is to be left in peace, so I can go to Erfurt and live with Dennis and be happy for the rest of our lives."

* * *

"Nobody is going to file charges in regard to bigamy," Maurice Tito said, "and I think I'll leave the finer points of sorting out valid consent to Larry Mazzare and whatever kind of canon law *Ehegericht* he cobbles together here in Thuringia once he gets back. Right now, I don't think that the prosecuting attorney, having read the testimony that they took over at St. Mary Magdalene's, is inclined to file bigamy charges."

"It might not be a bad idea to issue some sort of an explanation," Thomas Price Riddle suggested. People are wandering around all over town asking, 'Is she a bigamist? Is she going to be prosecuted?'"

"How?" Tito asked. "It's not that easy to get across, that the marriage was bigamous but that she isn't guilty of bigamy as a crime. *Black's Law Dictionary* is my resource of first resort. It defines the crime of bigamy as "willfully and knowingly" contracting a second marriage while a first marriage is still, to the knowledge of the offender, undissolved and subsisting. Pat and Dennis certainly did not know that they were married by common law in Kansas and Iowa. That seems to be perfectly clear to me. Though I intend to tiptoe very gently around the possible quagmire arising from whether their statements that they 'wanted to be married' to one another equates to 'they intended to be married' to one another while they were out there."

"Nobody's brought that up," Riddle said. "I suppose that I could assign one of my students to write an article about the distinction between bigamy as a condition and bigamy as a crime and send it to the newspapers. Whether that will make it clear to the average reader of the *Grantville Times* is another question. The fact remains that she was living in a state of bigamy and it's not going to be all that easy to explain the difference in terms the average person can understand."

"Given the procedural anomalies, such as Pat's assertion that she did not participate in applying for the marriage license. And how distinctly uncomfortable Francis looked when she said that, so much that he made his only contribution to the whole hearing. And that there is some question whether she actually repeated her vows," Tito said, "I'm not even a hundred per cent sure that she was in a state of bigamy. Though it would be nice, some time, to hear what Francis has to say about all the rest of this under oath."

"That's true, too. Is Martin planning to file charges against Francis or Mary Liz, for the way that wedding was arranged?" Admittedly, Tom Riddle was the prosecuting attorney's grandfather,

but he did try not to meddle in Martin's business. Better to ask Maurice.

Tito shook his head. "Aside from the fact that the testimony they took at St. Mary's isn't formally before the civil court system in any case, he's planning to use prosecutorial discretion if it does come before us. The most guilty party was O'Malley and he's been dead for years. Pat's not out for revenge against anyone. As she said, she just wants to be left in peace now. We can't see dragging her back and forth from Erfurt to give more testimony. Francis is in custody on multiple charges already, ranging from attempted murder to mutilation of a corpse. Adding a thirty-five year old drug rape charge won't make any difference; it's not a capital offense any more than the rest of them. Mary Liz is seventy-six years old and not well; it's not as if there's a danger to the public in the sense that she might do it again. There's Suzanne and her kids to consider. We're just going to leave it be."

"That's probably about the best you can do," Thomas Price Riddle said. "What a goddamned mess."

* * *

"So," Jonas Justinus Muselius asked cheerfully after the conclusion of the hearing on the Murphy marriage, "What did you learn?"

Pastor Ludwig Kastenmayer looked at him. "That the up-timers who continually assure us that introducing their way of doing things would greatly improve and simplify the existing seventeenth-century practices are often sadly mistaken."

"That, too, is valuable to know," Muselius answered.

Johann Georg Hardegg, who was of course one of Kastenmayer's parishioners, nodded his head solemnly.

"It is undoubtedly true," Kastenmayer continued, "that my service on the Schwarzburg-Rudolstadt *Ehegericht* for the next few years, sorting through the debris of failed betrothals and marriages, is going to be very time-consuming."

Muselius nodded.

"Yes," Hardegg said. "Undoubtedly."

"Therefore, I think," Kastenmayer said, "given Count Ludwig Guenther's budgetary problems, the parish is going to have to find some way of funding a salary for at least one assistant pastor on its own, without relying on a subsidy from the consistory."

Hardegg, who by virtue of his university degree had been installed as a member of St. Martin's board of elders almost the instant he took up residence in Grantville, suspected that he had been had. Coming up with a source for that salary and persuading the parishioners to pay the money would now be . . . his job.

February, 1635

"Since I'm going to hell anyway," Pat said to Dennis, "it seems a little silly for me to insist that we have to have a Catholic wedding now. Which we probably couldn't for ages and ages and ages. If ever. I'll marry you Methodist. Or at city hall. Or anywhere you please. I just want to keep the same rings."

* * *

"After all these years!" Dennis Stull said. "After all these years, *now* Pat agrees to get married

someplace other than a Catholic church. If she would have done that in Leavenworth in '65 . . . Henry Dreeson says he'll do a civil ceremony for us next week if you think it's too hot to handle."

The Reverend Simon Jones looked at his wife.

"'In for a penny, in for a pound,' the Reverend Mary Ellen said. "After all the furor surrounding the marriage of Wes Jenkins and Clara Bachmeierin, we can't get into any more hot water with the Veda Mae Haggerty's of First Methodist than we already are."

"True. When the pot is boiling, you're in it, and the cannibals are dancing around," Simon said, "what difference does it really make if you drop another log on the fire yourself?"

* * *

As Joe Stull said to Dennis later that week, the stuff that his and Tony Adducci's people had put together was a big help in confirming everything that Laura Jo told them about the way Horace Bolender and the Cunninghams were working that scam, which meant that the creeps got stiffer sentences than if everybody from Noelle Murphy to Carol Koch to Gordon and Jim Fritz hadn't done all that work, at least.

That was at Dennis and Pat's wedding, though. Dennis wasn't really listening.

CONTINUING SERIALS

Suite For Four Hands

By David Carrico

Intrada

Grantville
Late July, 1633

As he turned from closing the door of the Bledsoe and Riebeck workshop, Franz Sylwester found several pairs of eyes focused on him. "Well?" his friend Friedrich Braun asked expectantly. "What did the nurse say?"

Franz struggled to keep his expression solemn as he took his jacket off. He heaved a sigh and turned to hang it on a peg by the door. As he faced the others again, Marla moved closer and placed a hand on his arm.

"Franz," she started softly, obviously ready to comfort. He couldn't hold it in any longer, and broke out in a smile, then laughed.

"Frau Musgrove declares that my hand is good, is healed." He held his left hand up and flexed his fingers. The thumb, index and middle fingers moved easily. The ring and little fingers were still frozen in the same curved shape they had healed in after the knuckles were crushed in Heydrich's assault, but even those fingertips flexed a little. "So, I now have enough of a hand to hold things."

"Franz!" Marla squealed. She grabbed him and swung him around. "That's great news!" Friedrich, Anna and Thomas crowded around to slap him on his back in congratulations.

Ingram Bledsoe came in from a door at the back of the workshop. "What's the occasion?" Marla bounced over to him and gave him a swift hug, leaving him looking a little surprised but smiling nonetheless.

The others stepped back from Franz, who lifted up his hand again and flexed the fingers,

smiling. "Nurse Musgrove says I am not to come back, that I am healed."

"Congratulations!" Ingram stepped forward to shake hands. "That's great news!"

Franz held up his good hand for quiet, reached into his pocket and dug out a three-inch rubber ball. "Marla," tossing the ball to her, "please give this instrument of torture back to your niece. Tell her I thank her with all my heart for the loan of it, and that I never want to see it again!" Everyone laughed with him again, but they were all aware of how hard he had worked the last few months with that ball to rehabilitate his hand . . . squeezing it over and over and over again in every unoccupied moment . . . squeezing it until his arm ached to the elbow with the effort. They knew what drove him—the determination that he would not be a cripple, that in some way he would again be able to support himself.

Marla moved up and took his arm in both her hands.

"Franz," she said, "to celebrate this occasion, we've got a gift for you." He looked at her quizzically. "Anna, the first part's yours." Franz looked at his friend, wondering what was going on, while everyone else shifted around like young children trying to stifle exclamations. Anna walked over to a chest against the far wall, a chest that had come with them from Mainz, opened it up and took out a bundle wrapped in burgundy velvet. She handed it to Thomas, who passed it to Friedrich, who unwrapped the cloth to display a violin. As he held it out toward Franz, Marla felt him stiffen.

"That . . . that is . . . my violin," he stuttered.

"Yes," from Friedrich.

"How . . . how . . ." he stopped, swallowed, and forced himself to composure. "How is this possible? I smashed it . . . did I not?"

"No," Anna stepped up, smiling, "no, you did not. You did smash your bow that night, and you endeavored to likewise destroy your violin. You did indeed throw it at the wall that night, in your fever and your anger, but you ran out the door before you could see that although the scroll hit the wall above the bench, the body hit a cushion instead."

"The scroll was scraped," Friedrich added, angling the instrument to show the traces of the mar, "but I was able to smooth it down and apply new finish to it. And so," pressing the violin into his friend's hands, "it returns to you. Both are somewhat older, both are somewhat stressed by your experiences, but you still suit one another very well. We kept it safe until you were ready to hold it again." He stepped back, leaving Franz to clasp the instrument he thought he had destroyed—to hold it gently and pass one hand in a caress over its top.

Still staring at the violin—*his* violin—Franz said, "Never has a man had friends such as you. When I regained my senses, in my wanderings after I left Mainz, I grieved over this, grieved most sorely. The thought that I had wantonly destroyed my violin, made solely for the creation of beauty in a world that has not enough of it, did try my soul indeed." He looked up, blinking, eyes bright with unshed tears. "And today you have restored it to me. I have not words to thank you as you deserve." He looked back down at it as the tears spilled over, caressed it again, then embraced it for a long moment, his cheek leaning against the scroll.

The room was quiet, everyone respecting Franz's emotions. He finally looked up again, smiled a little, and said, "Thank you. I thank God for you, my friends, who have saved me, and now have saved my violin as well. Now I am free of that guilt, and I am free to find someone who will take it from my hands to love it as I do and to play it as I no longer can."

Marla took his arm again and turned him to face her. "Now for my gift. Franz, you don't have

to give it up. You can play."

Franz was shocked that she would say such a thing, and a flash of anger and sorrow went through him. "Do not mock me, Marla." Holding up his left hand, he said, "Even with the healing that has been done, I cannot finger the neck I cannot play."

"Maybe you can't finger the neck with that hand, but I'll bet you can hold a bow with it now! Switch hands! Learn to play with switched hands!" Marla was grinning with delight and bouncing slightly in her excitement. Franz felt stunned. Was it possible? Could he do it? He felt dazed, as if he had been hit in the head. He saw Marla put her hand over her mouth to keep from giggling, so he was sure he looked as amazed as he felt.

"It's true," Ingram said, grinning himself. "I knew a mountain fiddler once who had an accident that left his left hand like yours. He just taught himself how to finger the neck with the right and learned to bow with his left. Last time I saw him, he was just as good that way as he was 'tother."

Franz shuddered, and his jaw snapped shut. He felt an excitement building in him, and his eyebrows climbed to meet his hairline, causing Marla to giggle. He looked at her, and asked, "Do you think I can do this?"

"I know you can."

Taking a deep breath, Franz turned to Friedrich and said, "My friend, how long until you can make me a bow to grace the violin you have restored to me?"

"As it happens," Ingram interrupted, "that's *my* gift to you." He brought his hand out from behind his back, and presented a bow to Franz. "I always seem to end up with odds and ends of musical stuff. I've had this bow for ten years, never had a fiddle to go with it, never could bring myself to get rid of it. Now I know why. I was savin' it for you. It's made in the up-time style, not like the ones you're used to, but I believe you'll actually find it easier to hold with your hand the way it is."

"So," Marla spoke again, "you have your violin, you have your bow, you have your hand, and you have your friends. What more do you need?"

Franz looked around at the smiling faces, and smiled back. "Nothing."

"Then get started."

"As you wish, Mistress Marla," and he danced away from the jab she aimed at his ribs.

Bouree

Grantville
August, 1633

As he was giving the tuning knob a final twist, Franz heard the door open.

"So, have you decided yet?"

Franz looked up from his violin to see his friend Isaac Fremdling entering the choir room. "Have I decided what?"

"How you will string your violin, of course? Will you string it in the usual manner, or will you reverse the order of the strings?" Isaac pulled one of the chairs around and sat down.

"What do you think I should do?"
Isaac fingered his moustache, and after a moment of contemplation said, "'Twould perhaps be best to keep the usual order of the strings. In that manner you and another could play each other's instruments with no difficulty."

"An advantage, to be sure," Franz replied. "Yet think of this, if you will: it will likely be easier to learn to play again if each right finger will move in the same manner and in the same relationship to the strings as the left does—if to play an 'F' the related finger makes the same motion, only mirror reversed, if you will."

"A point," nodded Isaac.

"And then consider the bow. Would it not be easier to train myself to reproduce the position of the bow as in a mirror, rather than in a totally different angle and position?"

"Aye," Isaac nodded again.

"Well, then, Isaac, you have answered the question, have you not?"

"It seems that I have, at that," his friend laughed. " So you have decided, then?"

Franz chuckled, and held up his violin. "Friedrich has moved the sound post inside and made a new bridge. I just now finished the stringing and tuning. Behold, a mirror violin." He handed the instrument to Isaac, who examined it closely, tested the tuning, then attempted to place it under his chin.

"Pfaugh! It feels most unnatural to try to hold it under the right chin. But if anyone can do this, Franz," he handed the violin back, "'tis you."

"My thanks. I've no choice, you see, for now that I see a glimmering of light in the night, I will pursue it with all my heart."

Isaac looked at his friend, his expression sobered, and he said quietly, "I grieved for you when I heard of the attack."

Franz looked down, uncomfortable as always when offered sympathy. "I thank you, but as you are so fond of saying, 'The Lord giveth and the Lord taketh away. Blessed be the name of the Lord.' My pride needed curbing, I freely admit. I could wish that the manner of that curbing had not been so severe, and that I had been calmer and wiser and more considerate of my friends afterward. But it took long months of being alone before I began to slowly grow wise, and it was not until I found my way here to Grantville that I could begin to understand how and why you would say that. The Lord gave, the Lord took away, the Lord gave again, and I have learned to bless Him no matter my circumstance."

"Then you are indeed wise, my friend, for there are few enough even of gray-hairs who possess wisdom that equals what you have just shared." Isaac paused for a moment, then chuckled.

Franz raised an eyebrow.

"My initial reaction to your misfortune was grief indeed," Isaac said, "but hard on its heels came indignation in harness with rage. I must admit that the thought of applying the consequences of the Golden Rule to Heydrich did cross my mind more than once or twice."

"Surely you did not . . ."

"No, I could not bring myself to do it in cold blood. But there were others of like mind, and I doubt not that their conversations did find their ways to Rupert's itching ears, there to alarm rather than soothe. In truth, he began to company with various fellows, brutes from low taverns,

in fear of what had been rumored. And he found no ease in that none of the rest of us would be alone with him thereafter. All of us found it to be most humorous."

"Well, I am not saintly enough to not find some small pleasure in hearing of his discomfort," Franz smiled.

"Oh, aye, before we left Mainz he had become almost two men, one moment the loudest of braggarts, the next like a nervous hind when the hounds bell out. I have seen the man's head almost swivel completely in a circle as he tried to watch his own back."

"The wicked fleeth when no man pursueth," Franz chuckled. "It is perhaps the best vengeance. He will torment himself more than I could or would, and my hands and heart are clean."

"Indeed." There was another moment of quiet before Isaac continued, "As I said, I grieved when I heard. Of all my friends and fellow musicians, your love of the art is most like my own, and I knew well how I felt when someone attempted to take it from me."

Franz raised an eyebrow again.

Isaac made a hand motion as if brushing off a table top. "You know that I am out of the Jews, but I say nothing of my life before Mainz. I knew, however, what you would feel. I was born Isaac Levin. My father is—I trust he still lives—a rabbi in Aschenhausen, where our forebears settled when the elector expelled the Jews from Saxony. Early in my years I showed promise of music, and he desired me to become a cantor. But other music enticed me, that which I heard from the taverns, through the windows of the merchants' houses and the doorways of the salons. I hungered for more than the Psalms, for more than the music of our traditions. The wealth that was to be heard away from the synagogue filled my heart. I could not see how beauty such as that could not exist in God's presence, but my father rejected it. He forbade me, he lectured me; as I grew older he reasoned with me. He even took a rod to me more than once.

"Finally, in my sixteenth year, he caught me once again slipping away from the door of a salon, and dragged me in front of the elders of our congregation. Right soundly he berated me, and demanded of me a solemn oath by the name of God that I would abandon foolishness and obey him in this. He ended by saying to me that if I would not, then I would no longer be his son. I would be dead to him."

Franz whistled.

"Aye. I was stunned indeed, as were the elders. They argued with him that he was being too harsh, that he should not emulate Saul who drove away David, but to no avail. And all the while I tried to think of life without the music that was so much a part of me. He withstood them all, seeming to grow ever more rigid, and when they were finally silenced he turned to me and demanded my answer.

"I grappled my wits together, and gave the only answer I could give. I still remember every word. 'Papa, I have tried to do as you say, but you were the one who instructed me that the Holy One, blessed be He, created music, that His very spirit guided David when he invented the lyre. Do not now blame me if that music calls me. Some men are called to trading; some men are called to farming; some men are called to the working of metal; some men are called to the study of Torah; and men such as I are called to music. If I do not swear, I am dead to you; yet if I do, I will be dead inside. You force me to judge between two evils, to cause a death either way. But in truth, it seems to me that the greater evil would be to forswear what the Holy One above has placed in me. Papa, it will be as you will it, but I cannot swear.'"

"A grievous choice, indeed, for a youth to have to make." Franz placed a hand on his friend's shoulder.

"But the tale is not finished. I saw at that moment that my father had never truly understood me, for all his wisdom in Torah and Talmud. I saw that he had fully believed that I would swear, for the shock of my choice well-nigh shattered him. A proud, upright man he was, but he turned away from me gray and old. It was as if a tall and vital oak in the full bloom of summer in an eye-blink turned to a dead and hollow husk. The light in his eyes died, for he had made his command in public in front of the elders of the congregation, and his own pride and authority would not let him recant. His face turned to stone, his very voice turned to gravel as he said, 'Thou art dead to me; Thou art dead to me; Thou art dead to me.' He turned away, and trudged out of the court and into the house. The elders followed him, silently, except that for a moment old Joachim Arst, a man I had never before cared for, came to me. As tears coursed my cheeks, he placed a purse in my hands, saying, 'I believe that I have lost some coins in the streets today.' Then he took my face between his hands, and said, 'Always remember, young Isaac who is now a stranger, the Lord giveth and the Lord taketh away. Blessed be the name of the Lord.' And so I am now Isaac Fremdling, Isaac the stranger."

Isaac brushed a hand across his eyes, looked at Isaac and said gently, "And so I know somewhat of how you felt after Heydrich mauled you, for I know how I felt when I thought I would not have the music, and I know how high a price I paid to have it."

"Indeed," Franz said, aching in his heart for his friend, knowing the kind of desolation that had been dealt him. "How is it I never heard this, from you or one of the others?"

"Because I have not shared it these last five years; before now there was none who would understand, none who could know what I felt then."

Two young men—of different heritage, yet brothers in their love of music and the prices they had paid to have it—sat together in silence, contemplating things lost and things gained, and likewise contemplating the ancient wisdom of a man named Job.

Allemande

Grantville
Moments later

The door to the choir room crashed open, startling Franz and Isaac both. They had been wrapped so deeply in their thoughts they had not heard anyone approach. As the door panel bounced off the doorstop, a group of young men of an age with themselves broke into the room, arguing at the top of their lungs. They threw their books down on the tables at the head of the room and carried on with their heated discussion. Two of them in particular stood almost toe-to-toe, arms waving frantically. German epithets were bouncing from the walls and ceiling, the mildest of which were "Fool!" and "Imbecile!" The others quickly turned to egging their champions on, and if the volume did not decrease, at least the mass confusion did. Franz began to chuckle. They were such a sight: faces red, veins bulging on their foreheads, hair dancing wildly. He leaned over to Isaac, who was grinning broadly, and near-shouted in his ear, "I wonder how long Thomas and Hermann have been at it this time?" Isaac shrugged, but didn't try to shout over the din.

For a moment there was quiet, as both men ran out of breath at the same time. Chests heaving, sweat running down their faces, they stood glaring at each other. Nothing was settled, though—this wasn't even a truce. It was more in the way of a pause for breath in a long-fought duel between two very evenly matched opponents. That last thought caused Franz to laugh out loud, for although the two champions might have been evenly matched with their chosen weapons of words, little else about them was.

Thomas Schwarzberg, one of Franz's closest friends, was a very tall man. Even among the giants of Grantville he stood out; among the native down-timers he was more than the Biblical head and shoulders taller. On the other hand, Hermann Katzberg was short, even for a down-timer. Franz doubted if he was five feet tall, especially if he took off his boots with the built-up heels. He was stocky, though not misshapen, and reasonably handsome with dark hair. In Franz's mind, Hermann was more than a bit pugnacious, as he had just been demonstrating—possibly an in-born temperament, but just as likely an attitude adopted to keep the taller world in which he dwelt from overlooking him. It obviously irked Hermann just now that as much as he wanted to be nose-to-nose with Thomas, he was actually more like nose-to-navel.

The two were both excellent musicians, adept at several instruments, although each had one in which he was clearly superior. Hermann was perhaps the best harpsichordist that Franz had ever heard—better even than Thomas, which was praise indeed. Thomas, on the other hand, was far and away the finest flautist it had been his pleasure to hear, although Hermann, in his turn, was more than competent with a flute. Neither man had met the other before they came to Grantville; Thomas at Franz's invitation, Hermann following rumors of new and powerful music. Within hours of their first meeting, they had accurately assessed each other's skill and moved directly to mutual respect. And indeed, on most days and on most subjects they were very amicable and usually in agreement. There was one topic, however, on which both men had very strong opinions, and they were on different sides of the issue.

Just as Hermann opened his mouth to renew the verbal conflict, Marla Linder came walking in the door, books in arms. She stopped dead at the sight of Thomas and Hermann on their feet. "Not again!" She stalked over to the instructor's desk, dropped her books with a loud slam, and glared at Franz and Isaac. "Can't you keep them under control?"

"The battle was well under way ere they arrived, Fraulein Marla," Isaac said, holding up both hands in a placating gesture. "In truth, it were worth our lives to attempt to come between them." His inability to repress a grin garnered another glare from Marla.

"And I suppose that's your story as well." She shifted the adamantine gaze of her icy blue eyes to Franz.

"Well, as they had not progressed to the throwing stage yet, I had hopes that they would run out of energy soon." He twitched his shoulders; Marla was obviously in a testy mood today.

Marla snorted, turned to the other men and pointed at ranked chairs. "Take a seat!" Looking over her shoulder at Franz and Isaac, she added, "You, too!" They all wasted no time in obeying. As they did so, Franz propped his chin on his good hand, looked at them all through half-lowered eyelids, and smiled a little.

He remembered the day these discussions began. He and Thomas and their other close friend Friedrich Braun had met with the musicians that were going to participate in the music "sem-i-nar." In addition to Isaac, another of the newcomers was a man that he and Thomas and Friedrich had known in Mainz—Leopold Gruenwald, a maker of trumpets who was also a player of some skill. Leopold was the last of the musicians that Franz had invited to come to Grantville.

Of the others, there was Hermann, of course, and two brothers, Josef and Rudolf Tuchman. Hermann had come from Magdeburg, and the brothers Tuchman had followed the rumors all the way from Hanover to Grantville.

Leopold and Isaac were willing to accept the unanimous declaration of Franz, Friedrich and Thomas about Marla's knowledge, talent and musicianship. The other three, however, had come seeking the new music that was hinted at in the rumors, seeking with an odd mixture of skepticism and hope. Once they heard what they would have to do to learn it, the skepticism rose to the top and they expressed some serious reservations. The thought of sitting in a school room to learn music was unheard of, by all that was holy. Musicians learned by doing, by sitting with other musicians and copying technique until they made it their own. This sitting in a room and talking about it was nonsense!

Then they found out that the seminar leader was to be a woman, and hackles started rising. By all that was unholy, a woman had no place in music, or at least not in the serious work that they themselves were doing!

Franz remembered shuddering as he looked around to make sure that Marla was not in ear-shot. From the expressions on their faces, Thomas and Friedrich had been thinking much the same thing. Together they faced forward and glared at the Tuchmans, who had been the most outspoken in their opinions. Franz had started to speak, but Thomas held up his hand and Franz swallowed his words.

"I make allowances," Thomas had said sternly, "for the fact that you do not know Fraulein Marla. I also agree that a woman musician is most unusual, although perhaps not strictly unknown. However, I strongly urge you to keep the words you have just said behind your teeth in the future.

"Let me make it clear to you: you will accord to Fraulein Marla the minimum respect you would grant a visiting doyen or master. You will find that she is worthy of it."

"And what if we do not?" Josef had asked, almost sneering.

Three faces had glowered in return, and Josef's face went blank

"You will not be allowed to learn from her," Franz had said finally. "And there is no one else to learn from, for Master Wendell has said that this is to be her work."

"Well, will she go all faint and quivery if I yell," Hermann had demanded, "or, God forbid," going falsetto, "I should be vulgar in her presence?" He had looked very nonplussed as Franz, Friedrich and Thomas had burst into laughter.

"No," Franz had choked, fighting down the mirth, "she is no wilting flower. She will assuredly deal with you as you are." Sobering quickly, he had reiterated, "She is worthy of your respect." Hermann looked at the brothers and shrugged, and they all nodded.

Franz felt Isaac nudge him, and he came back to the present quickly, noticing that the room had gone quiet. Marla's eyes were drilling into him. "Excuse me," he said.

"You with us now?" Marla asked sharply.

"Yes."

"English or German?"

She was asking what language this day's discussion would be held in. They had adopted the practice of alternating between the two to strengthen Marla's command of German and help the others improve their English.

"English," Franz said, and his heart beat faster as she rewarded him with one of her glorious smiles.

"Good," she said. "That's the first thing that's gone my way today." She glanced at the door, then back at the others. "We're going to have guests today. Elizabeth Jordan, one of my former voice teachers, has made contact with a couple of Italians who wish to join us today. One is a musician—a composer, I believe—and the other is a craftsman of some kind. They should be here any . . . ah, and here they are now."

The door to the choir room opened, and a short, slightly plump woman entered, followed by a short man in a black cassock. Franz didn't quite goggle at him, but was taken back a bit. One did not ordinarily expect that mode of dress in Grantville, or at least not in the high school. A Catholic cleric of some kind, obviously.

The third member of the party was somewhat larger, but definitely not of a size to stare Thomas eye to eye. Franz estimated he was about his own height. He moved with some grace, but was obviously not a courtier. He must be the artisan that Marla had mentioned.

"Elizabeth, you're just in time." Marla stepped forward and shook hands with her former teacher. "Please, introduce your guests."

"This is Maestro Giacomo Carissimi and Signor Girolamo Zenti, all the way from Rome." Each man nodded slightly when his name was called; Carissimi stiffly, as if he wasn't comfortable, and Zenti with a slight, crooked smile on his face. "The maestro has come in search of knowledge about our music, and Signor Zenti looks for knowledge about musical instruments. When you told me yesterday what you would be discussing today, I knew they would both find it of interest."

"Thank you for coming," Marla said, offering her hand. Carissimi hesitated, then reached out and shook it quickly, releasing it at once. Zenti in turn took her hand, and instead of shaking it raised it to his lips. Marla was obviously taken off guard, but kept her composure and retrieved her fingers as soon as he released him

Marla turned and had the others introduce themselves. As they did so, Franz decided that the maestro was innocuous, but that he could find himself taking a dislike to Zenti without much effort.

Once the introductions were completed, Marla said, "Please be seated where you please. We were about to get started. And please, feel free to speak up at any time. This bunch certainly does."

With that, she shifted her focus again to Thomas and Hermann, who, despite their verbal combat were sitting next to each other. "You two were arguing about tempering again, weren't you?" They nodded cheerfully. "And the rest of you," sweeping a hand motion to include Josef, Rudolf, Leopold and Friedrich, "were kibitzing and cheering them on from the peanut gallery, right?"

Smiles and nods were mixed with confusion over the figure of speech. "Meanwhile, the grinning gargoyle brothers over here"—she pointed to Isaac, who looked offended, and Franz, who just smiled—"were laughing at all of you. And you probably deserved it."

She sat down at the piano, and placed her hands on top of the cabinet. "I'm tired of all this argument, so I've spent the last couple of days researching this issue, and I'm ready to put a stake in it and bury it for good." The Italians looked very confused, but Elizabeth was whispering to them, explaining Marla's figure of speech.

As always when she started one of their sessions, Franz was a little nervous for her. He knew her heart, her desire: how she desperately wanted to succeed at this work; wanted to bring the glory of the music she knew to the time she was now in; how she wanted to midwife the birth of a glorious age of music. He knew how hard she studied and prepared. He knew how when she first started her stomach had ached before every class; knew, too, how she had castigated herself after each of those early sessions because she felt she had sounded uncertain and timid rather than assured and self-confident. The fact that he had detected nothing of the kind and repeatedly told her so was no comfort to her. But gradually, as she learned that she could teach them, that she could hold her own in discussions with them, that she could find answers to all their questions, she had indeed found assurance and self-confidence, and their sessions had become the joy that she had so wanted them to be.

Today, however, she was tackling head on an issue that she had been dancing around for weeks, the issue of tunings and tempering systems. If she was feeling nervous, there was no evidence of it in her demeanor. She sat there calmly, smiling slightly, looking cool and collected in front of the eight of them.

"Hermann, how many tempering systems are you aware of?"

He sat in thought for a moment, then said, "The Just and the Pyth . . .

Pytha . . ."

"Pythagorean," Thomas prompted.

"Pythagorean systems," he muttered under his breath.

"What did you say?" Marla looked at him with her head tilted to one side.

He squirmed a little, then said, "I have trouble wrapping my tongue around that name when I'm speaking good *Deutsche*. It is even harder with English."

"Continue."

"Just, Pythagorean, and Mean are the ones I know of, Fraulein Marla."

Franz looked at him out of the corner of his eye, checking his attitude, but he seemed totally serious.

"And of those, which are in common use?"

"Only the Mean."

"Why is that?"

Hermann thought for a moment, wanting to make sure he didn't trip up, then said, "Because the other two are too limited, are too discordant except in a few keys."

"Right. But, can't you say much the same thing for the Mean temperament as well?

Hermann looked stubborn, while Thomas made no attempt to suppress a very wide smile as Marla made his case for him. Franz watched to see how Marla would handle this. He wanted her to do well, to bring Hermann around, because to be the power in music in the USE that he thought she should become, she had to be able to engage the stubborn peers of his musical generation in dialogue, reason with them and eventually bring them to see her positions. Hermann was perhaps her first serious test, as he himself, Friedrich and Thomas had been won over very easily.

"Hermann," she said, "you have to face the fact that the Mean system works okay with voices, strings and horns, all of which the musicians instinctively tune, usually without even being aware they're doing it. But with any kind of keyboard, it is just too limiting. You're basically limited to

four or five tonalities, the simpler ones." She set her hands on the piano keys, saying, "Stay with me, Hermann. We're going for a ride"

Marla began playing "*A Mighty Fortress Is Our God*." Over the simple harmony, she said, "You know this hymn. Even in the time we came from, it's one of Luther's most famous works. It's in our hymnals in the key of C major—no sharps, no flats. Now listen, and listen carefully."

Franz saw an intent expression come over her face, one that he was coming to know very well. He nudged Isaac, and mouthed to him, "Get ready."

There was a brief pause, then Marla's hands began moving swiftly over the piano keyboard. Arpeggios were rolling up from the low end of the keyboard, and over it she began playing the melody and harmony of the old hymn in the traditional 4/4 time. At the end of the verse, she played a transitional phrase which modulated into a sustained chord, then suddenly began playing a light rendition of the song in 3/4 time, almost a dance, in a new key. Again, when she came to the end of the verse she played a transition, this time immediately modulating to a new key where once again she played in 4/4, this time playing the song as a canon of repeating lines over a constant bass note. Another modulation, another style—this time a quiet meditation, almost in the manner of an adagio.

Franz looked at the others, and saw on the faces of the newcomers the stupefaction he had expected. He, Thomas and Friedrich knew Marla's talent, but this was the first time she had unleashed its full potential before Isaac, Leopold, Hermann and the Tuchman brothers, and they were obviously stunned.

Once again she modulated, this time playing the old hymn in a hammering martial style, at once pompous yet regal. She brought it to a rousing close, playing the last line in a slow ritard that allowed her to alternate chords first in the treble keys, then in the bass, using the sustain pedal to let them ring and create an effect that almost rivaled an organ for richness and sonority. She allowed the final chord to resound in the room, then released the pedal and let the piano action damp the strings.

Franz saw a small smile play about the corners of her mouth as she took in the expressions of the others.

"Okay, guys," she said, "how many keys did I play in?"

Hermann shook himself, looked at the others, and said, "Five." They nodded in support.

"And what were they?"

"First was C."

"Right."

"Then the next was . . . G."

Hermann sounded a little reluctant, and Franz thought he knew why. When Marla smiled, he knew he was right.

"And what is G to C?" Marla asked.

"The dominant,"

"And in the Mean system," she said, "can those two keys sound consonant in the same piece of music?"

"Yes."

"Ah, but what about the next keys? Where did I go from G?"

"D?" Hermann sounded a little unsure of himself.

"Yes, D was next. I used an augmented sixth chord for the modulation, so it was a little tricky, but you got it, we landed in D. D is the dominant of G, right?"

Heads nodded all over the room.

"So now we have C, G and D. Is consonance possible in the same piece with those keys? Just possibly," she answered her own question, "just possibly. But where did we go from there?"

No one ventured a guess.

"Thomas, did you follow?" When he shook his head, she smiled again, and said, "Okay, I'll have mercy on you. I went from D to A, and ended in E. See the pattern in the modulations? Each time I modulated to the dominant of the previous key. I've now got five different keys in this piece, ranging from C major with no sharps or flats to E major with four sharps. Hermann," she looked at him seriously, "in the Mean system, can I have all five of those keys sound consonant *in the same piece of music*?"

Franz heard her emphasis, but was glad to note that her tone of voice and her expression were both serious, that there was no sense of mocking or humor. She was treating both the topic and Hermann with respect.

The room was quiet. No one said anything, no one even stirred until Hermann finally sighed, and said, "No, Fraulein Marla, you cannot. Your point is made."

"But don't you see, Hermann," Marla said, "don't you see that it's not *my* point? This is not some dictate that I'm trying to force upon you. It's not some up-time invention or standard that I'm trying to shove down your throat. The earliest mention I could find for equal temperament goes all the way back to some guy named Grammateus in 1518—that's over one hundred years before today, for heaven's sake! Equal temperament was something that generations—your predecessors in music, your peers now, and your successors in music—all worked toward. As composers and performers alike desired more tonal complexity and sophistication in their music, as they experimented and argued amongst themselves and with their patrons, they eventually hammered out a consensus for the equal temperament system."

Marla looked around at all of them, then said slowly, "And Hermann, it was the Germans who arrived at it first. By 1800, this was the standard in German music. It took the rest of the world at least another fifty years to catch up to you. So you see, I'm not trying to force the stream of music into an unnatural streambed, I'm not trying to force it to flow uphill. Instead, I'm trying to guide you into the natural bed for your stream, but I'm trying to guide you to it now instead of several generations later."

Hermann muttered again. Franz saw Marla lift an eyebrow, Hermann coughed, and said, "But it still sounds discordant."

"Of course it does," Marla laughed. "It's a result of musical diplomacy. I once heard a definition of diplomacy that goes something like this: diplomacy is the art of leaving all interested parties equally dissatisfied. That's a perfect definition of equal temperament. All keys are slightly less than consonant, but importantly, all keys are equally dissonant. Once we accept that compromise, then the full artist's palette of tonalities is available to us."

Franz smiled at her metaphor.

"Believe me," Marla added, "I know exactly how discordant equal temperament is. I have absolute perfect pitch, so anything less than pure consonance grates on my ear. But, I will accept the minor discomfort that equal temperament causes in order to play things like this."

She turned to the piano again, and began a piece in 3/4 time. It lilted and danced, almost like a stream flowing over rocks. The music flowed, with waterfall-like runs in it, broadened out to a more stately theme and treatment, then returned to the original style. Marla's fingers flew, the tempo ebbed and flowed, and finally began to move faster and faster until it trailed away under the right hand in the high treble keys.

Once again dead silence reigned in the room, until it was broken by a collective sigh from the men. Marla turned to them, and said, "That was the Waltz in C# minor by Frederic Chopin, part of his Opus 64, one of the loveliest piano pieces ever written. The key has four sharps, and it probably couldn't be played in the Mean system."

Looking around the room, she asked, "Any questions? Any comments?"

"Excuse me, please, Signorina," Maestro Carissimi said.

"Yes, sir?"

"I understand what you say, and it makes clear much that I did wonder about. But is there not a . . . how would you say . . . along side . . ."

"Parallel?"
"Yes! Thank you for the word. Is there not parallel issue, one of tuning, of intonation?"

"Oh, absolutely," Marla said. She pressed a key on the piano, and a tone sounded. "That is an A, the note defined by international agreement to be the tuning standard. And there are machines and tuning forks to exhibit that standard and to measure against. That standard was arrived at almost," she looked confused for a moment, "well, what would have been almost 250 years from now. But between now and then, tuning was a local matter, usually determined by whoever built the organ in the local church or cathedral."

"Exactly my point!" said the Italian. "In Italy, the tuning is higher, brighter than in Germanies, but even within a province, is not the same from place to place. Until a standard for all of Europe can be devised, we musicians must still adjust tuning as from place to place we go. Music written for Italian churches transcribed to other keys must be to get same sound in northern German churches, and perhaps the same if northern music to Rome or Naples is brought."

"And that will change not so quickly," his companion said. "Musicians—especially Italians—will not like hearing that wrong are their tunings." There were murmurs of agreement from around the room, and Thomas and Hermann in particular nodded vigorously.

"Well," Marla said, "at least we all agree that developing a standard tuning is a problem, and that it probably won't be solved soon. But do you all understand why the equal temperament is so important?"

Heads nodded all around, and "Yes," was heard from every corner.

Marla looked down at her watch. "Yikes! I didn't realize it was that late! This is Wednesday night, and I've got choir rehearsal at church. Okay, we'll meet again on Friday here in the school choir room. We'll finish the discussion we started last time about modes and the changeover to major and minor keys. See you then!" And in a whirlwind, she grabbed her books and was gone. Elizabeth and her guests also rose, made their farewells, and left.

The eight young men sat quietly for a moment, as if drained of energy. Finally, Hermann looked up, and said to Franz, "Now I know what you meant. She is indeed worthy of our respect. It would be an insult to say she does not play like a woman, but when I close my eyes, all I hear is a musician of great skill and talent playing with vigor and authority."

He sighed. "Forced to discard another preconception. Two in one day. At this rate, in another month she will have me cleaned off like a blank slate, a *tabula rasa*."

"Well, I am tempted to ask if that would be such a bad thing." Thomas grinned, obviously restraining himself from crowing over Marla's victory. "But instead I will say that you at least had the advantage of knowing her first, and seeing that she did indeed posses some knowledge and skill before she unleashed the full fury of her arsenal on you. Friedrich and I, we were exposed to the full-bore power of her talent within hours of first meeting her."

"And do not forget the hangovers," Friedrich interjected.

"*Ach*, how could I forget? The memory of the thunder in my skull being matched by the thunder of her piano playing still makes me shudder!" Thomas matched actions to words. "Some time, Hermann, have her play for you the "Revolutionary Etude." Then you will see the full scope of her power, and you will truly understand why I sit at her feet."

"But she is so young!" Josef said. "How can she be so strong, so assured,

so . . . so . . ."

"Authoritative?" Thomas supplied.

"Yes, how can she be so authoritative? How can she be like a master at her age?"

Thomas looked to Franz. "How old is she?"

"She recently passed her twenty-first birthday, which is young but not so young. To us, she's of an age to be a journeyman. To the folk of Grantville, she's her own woman, to do as she pleases. Most of them know she is talented, but I believe that Master Wendell and perhaps Master Bledsoe are the only ones who truly appreciate her magnitude. Master Wendell says that if not for the Ring of Fire, he thinks she could have been one of the great ones of their time."

He stood and walked over to look out the window. "She is driven to mastery. Her spirit, her gifts drive her to rise above her origins, her womanhood, to become a master." He turned to face them. "She will not stop until she is either broken or is acclaimed by all."

"So if she is of age, why is she not married, as so many of the Grantvillers are?" asked Josef. "She is comely, and seems pleasant enough."

"Hah!" snorted Rudolf, surprising everyone, since he was the most taciturn individual most of them had ever met and never volunteered anything. "No, thank you. That *fraulein* has sword steel for a spine, and I suspect she could out-stubborn Gustav Adolf himself. She may be a muse incarnate, a very Calliope . . ."

"Take care," Friedrich warned.

"Nevertheless, I fear that most men would desire someone with at least some compliance in her soul. Fraulein Marla may be doomed to a spinster's life."

Friedrich and Thomas burst out in uproarious laughter. Friedrich actually slid out of his chair and rolled on the floor. Thomas bent over holding his stomach, howling.

The newcomers all stared, eyes wide and jaws agape. Finally Hermann collected himself. "What is the jest?" he demanded.

Thomas managed, by sheer willpower, to somewhat compose himself. "The jest," he wheezed, "stands there." He waved a hand at Franz. Franz waved back, smiling slightly, as Thomas continued. "Our man Franz there woos her."

"Not just woos," Friedrich husked, levering himself into a sitting position on the floor. "Not just woos; for he has won her heart."

The astounded expressions returned, now focused on Franz. He shrugged and said, "'Tis true."

"Then why have you not wed, if you feel thus?" asked Hermann.

Franz lifted his left hand, and everyone sobered. They all knew the story by now. "When I can play again in public, when I can again make my way with my violin, then I will ask her." The fire in his heart at that moment was a match for Marla's, and enough of it showed that the others actually sat back a little.

"She assents to this? It seems somewhat unlike her," said Rudolf.

"She knows. She agrees."

They all looked at Franz soberly. He bore their gaze calmly, and they all saw the determination in his eyes. Finally Hermann spoke.

"Of all men, Franz, you may be most worthy of Fraulein Marla."

As the others nodded, Franz said quietly, "'Tis the challenge of the rest of my life, Hermann."

Gigue

Grantville
A few days later

"C'mon in, guys," Marla said to Franz and Isaac, holding open the door to her Aunt Susan's house. "The rest of the group is already here." She led them into the living room, where the only seats left open were the hard wooden chairs that had been brought in from the dining room. The sofa and easy chairs had already been claimed. Thomas, Hermann and the others grinned at them from the soft seats as Marla's aunt bustled around handing out glasses of apple cider and water. Cookies were evident all around, and Thomas was almost oblivious to their entry as he blissfully devoured a slice of apple pie that must have occupied a quarter of the pie pan it came from.

"Sit down, boys, sit down," Susan said, as she went by them on her way to the kitchen. She came back out with glasses of ice and pitchers of cider and water and set them down on the coffee table in front of them. "Fill up with whichever you like," came back over her shoulder as she returned to the kitchen once more.

She reappeared carrying another plate of cookies, which Isaac took from her with alacrity, fending off hands that reached toward it from those who had been there before him.

"Away with you, jackals," he mock-snarled, holding the plate out of their reach. "'Tis bad enough that you usurp the chief places, leaving poor Franz and myself to set our nether portions on the hardest seats. 'Tis not enough that you have already wreaked destruction upon good Frau Garrett's provisions. But when she takes pity on poor Franz and myself and brings forth the fruits of her labors to revive us, you attempt to acquire them as well. Nay," he laughed, leaning away from Hermann, "nay, you will not have them. Look to your own!"

"But there are only crumbs here," Hermann whined.

"Then lick the platters clean," Franz weighed in, taking a handful of cookies from Isaac's plate, "for you'll have none of ours."

He took a bite, and the expression that came over his face rivaled that on Thomas', who had finished his pie and was now diligently scraping his plate clean and licking the fork.

Franz stood and bowed to Susan. "Frau Garrett, once again you have demonstrated your command of the baker's art, and produced what might be a model for the ambrosia of Olympus."

"Enough of your foolishness, Franz Sylwester," Susan said, blushing slightly as she wiped her hands on her apron.

Marla's aunt was indeed one of the best bakers in town, but at this point in the post-Ring of Fire existence of Grantville, she had what some in town considered an unfair advantage. Her husband, Jim, had owned and managed Garrett's Super Market when the Ring fell. As soon as she had recovered from her shock and thought through the implications of that event, she had marched right down to the store and commandeered all the spices that were left on the shelves. As a result of her foresight and her sparing use of them, she had bottles of cinnamon, nutmeg and other spices hidden away long after most of the other households in town had run out. True, spices were now available from the down-time merchants that serviced Grantville's economy, but their supplies were low in quantity and erratic in availability, which kept the prices quite high. As a consequence, in the late summer of 1634, if a baking mood settled on her, children from all around could be seen gathered around the screen door to her kitchen inhaling the aromas, and it wasn't unknown for grown men to plead for the privilege of licking her mixer beaters and bowls.

Franz and Isaac gave testimony to Susan's skills as they wasted no time in reducing their plate to mere crumbs as well. There was silence as everyone was either chewing or chasing crumbs around their plates, obviously thinking hard about licking them, but resisting the temptation. Finally, Marla stood up.

"Okay, guys, let's get started. English or German?"

"English," several voices replied.

"Good," she said, "because I'm not sure I could discuss today's topic in German.

"I asked you to meet here today, because I needed access to a good stereo." She put her hand on a stack of black metal cabinets piled on a small table next to where she stood at the head of the room, and then pointed to some fairly large wooden boxes in the corners of the room. Franz noticed wires running from the metal cabinets to the boxes in the corners, and deduced that they must be some type of the "speakers" that were used elsewhere in Grantville to produce sound and music from the shiny silver discs called CDs. The speakers had the letters "JBL" on an emblem. He wondered what that stood for.

A sad expression crossed Marla's face, and she said quietly, "This was my brother Paul's stereo. Before the Ring fell, he spent hours listening to it. This is the first time it's been hooked up since then."

She fell silent for several moments, then sighed. The others waited patiently, knowing that her brother, along with her parents, had not been within the radius of the Ring when it fell. Franz in particular knew how hard she had been struck by the knowledge that she would never see them again.

She looked up and, with an obvious effort, said, "Anyway, I want to spend tonight talking about popular music.

"There has always been a difference between the music done for art's sake, and the music done to please the common man. You know that's true. The music you create for patrons, and I include the church in that category, is different from the music you create on street corners and in taverns. It may be related—you know as well as I do that melodies from the street and the taverns have a way of sneaking into even the music written for the churches—but there is a definite

difference in complexity between the two. The more complex the music grows, the smaller it seems the audience is who can truly appreciate it.

"As I said, this has pretty much always been the case, but until the early 1900s the music of the streets was more of an undercurrent in the stream of music. That changed with the invention of mechanical devices that could record music played in one place onto some kind of medium, such as wax or types of plastic—" They all nodded at the reference to the magic stuff that was so prevalent in Grantville. "—or even the CDs.

"What happened was once the average citizen could own a device that would play whatever music he wanted whenever he wanted it, he began buying the music he liked. That changed the way music was created and performed. By the 1970s, it was becoming difficult for many orchestras to exist, partly because people were buying different music than what the orchestras played, and partly because even the music the orchestras did play could be recorded, bought and played any time.

"The popular music, the outgrowth of the music of the streets, took many forms. Most people would like a few types. Very few people liked them all. But in almost every case, the popular musicians became like heroes, and it became a status symbol to people to have a lot of these recordings. The more you had, especially of rare or new or avant-garde musicians, the more status you had among your friends. By the time I was in high school, a ridiculously large amount of money was being spent every year by people all across our nation to purchase these recordings.

"The styles of music diverged for a while, but inevitably they began influencing each other again, both between different types of popular music and between the popular music and the art music."

Marla stopped here, took a drink of cider, then picked up a CD and began to turn all the equipment on. "We're going to listen to a number of different kinds of popular music tonight. Some of it you may like, most of it you will find discordant, some of it you will out and out hate. But this is part of what music was right before the Ring fell."

* * *

Susan turned back into the kitchen from the door into the living room as music began to flow out of the speakers. She recognized the tune: "The Entertainer," by Scott Joplin. She was slightly pleased with herself that she knew it . . . Lord knew that music was not her strength, not like Marla and Paul and their mother Alison. Now that Marla was so involved with this bunch of boys—young men, rather—she had rather the feeling of the duck that had hatched a swan. Marla was growing and stretching her horizons, and Susan could only stand behind her and watch her go. It was good to see her living and laughing again, but it still was a little scary to see her surrounded by these young men all the time, talking about things that Susan didn't understand. If only John and Alison could have been with her. They would have been so proud of Marla, and Alison at least would have understood her and what was going on.

She dabbed at her eyes with her apron, then muttered, "Standing around leaking tears isn't going to get the dishes done, silly." She began running the water in the sink, added the soap, then gathered up the bowls, pans and plates and put them in the sink. As she was turning the water off, the outside screen door opened, and she looked around to see Ingram Bledsoe and Hans Riebeck coming in.

"Sorry we didn't knock, Susan," Ingram said, carefully closing the door, "but we didn't want to disturb anything."

"That's all right," she said, drying her hands on a towel. "You all want some water or cider? I'd offer you some cookies, but those two-legged vacuum cleaners in the other room have already Hoovered up everything I baked today."

Ingram chuckled, and said, "I'll take some cider, thank you kindly."

"I, too, *bitte*," Master Riebeck said. His English had rapidly improved since he had first come to Grantville back in March, but he was obviously still thinking in German and translating to English as he spoke. Occasionally, what came out sounded a little odd or stilted to American ears.

In the other room, the music had ceased, and there was a murmur of conversation. Ingram looked that way, then looked back at Susan and said, "How's she doing?"

She shrugged. "You're askin' the wrong person, Ingram. I'm a Linder born, and ain't no Linders been musicians before Paul and Marla. Grandpa used to say that he was goin' to sing in Heaven, but it would take Heaven for him to do it. The Linder women all sound like rusty gates, and the men all sound like asthmatic bullfrogs. Even Marla's older sister Jonni takes after us. No, it was the Easterly blood that brought Paul and Marla their talents."

She picked up her glass of water and swirled it around. "Alison used to say that her great-grandmother was half Black Irish and half Cherokee and was what the old folks used to call a cunning woman, but that even in her eighties when Alison knew her, she could still sing the birds out of the trees onto her fingers. She said all the talent came from her."

She raised the glass and swallowed the water. "John was mystified by them two kids," she continued. "He didn't understand them at all. Called them his cuckoos sometimes. He was proud of them, though. He'd about bust his suspenders any time that Marla sang, and he just about couldn't keep his feet on the ground when Paul played that guitar." She set the glass in the sink, and she stared into the soapy water. "It about killed him when Paul got the cancer. He lost about as much weight watching Paul suffer through the chemotherapy for the leukemia as Paul did. That's why they weren't here when the Ring fell . . . they'd driven Paul to his next treatment. Oh, drat," she said matter of factly, wiping her eyes with her apron again. "It's been over three years. You'd think I could talk about them without crying."

She was surprised when Master Riebeck reached a gnarled hand over and patted her shoulder. "Frau Susan," he said, "those we love, we love forever, we miss forever. My brother was younger than me. He died years ago. I miss him still."

"Thanks," she said softly. "I miss them, I worry about how they felt and how they handled our being gone, but I think the worst is that we don't know what happened to Paul. Marla had a bad cold, so she'd been sleeping over here for several days so she wouldn't infect him. She didn't even get to say goodbye. She took it hard, real hard."

Ingram nodded in agreement. "The Bible says Hell is a place of fire, but I seem to remember readin' about some guy who said that there was a place of ice in Hell."

"Dante Alighieri," said Master Riebeck.

"Whoever. I could almost believe that, 'cause that's what Marla was like after the Ring fell," Susan said. "Her soul was frozen, and she was pure cutting edge. I thank God every night for Franz Sylwester. I mean, I'm sorry he got hurt and all, but I think it was purely the hand of God that brought him to Grantville and to Marla. Whether they marry or not, he's made her live again, and he'll always have a place in my heart and my home because of it."

"*Ja*, and we say *danke Gott* for Fraulein Marla, because she gave him life and worth again."

"Ain't it funny how God works?" The two men raised their glasses in a toast to that simple

truth.

A long moment of quiet followed, and the music from the other room intruded. A man with a silky voice began singing. Ingram raised his eyebrows. "Frank Sinatra? What's she doing tonight?"

"She said she was going to walk them through one hundred years of popular music tonight."

"Well, it sounds like she's only up to about 1940. She's got a ways to go yet."

* * *

Franz's head seemed full to bursting, and he was very glad to hear Marla say, "Okay guys, we're almost done. Let's take a quick break, and then we'll wrap it up with one last song."

She disappeared down the hallway to the bathroom, and everyone else just seemed to slump in their chairs. Isaac leaned over, rested his elbows on his knees and put his head in his hands.

"Oooh," he moaned. "My head is spinning. Ragtime, Dixieland, jazz . . ."

"Southern gospel, black gospel . . ." Hermann added.

"Blues . . ." from Leopold.

"Country and western . . ." Josef and Rudolph said together.

"Rock and roll," finished Friedrich.

"Louis Armstrong . . ."

"Glenn Miller . . ."

"Harry James . . ."

"Billie Holiday . . ."

"Frank Sinatra . . ."

"Elvis Presley . . ."

"Brubeck . . ."

"Hank Williams . . ."

"The Beatles . . ."

"Johnny Cash!" several voices said at once, and they all started laughing.

After they regained their composure, Friedrich said, "How can so many different styles have developed so quickly? Our music develops slowly, changes slowly. Why did theirs change so rapidly?"

"We've already talked about the access to mechanical and electrical systems to play music," Marla said as she walked back into the room. "Another factor, though, is the changes in the place and authority of the church in society. For most of its existence, the church has been a conservative institution. That can be a good thing, at times. However, it can also be a drawback, for conservative organizations tend to be very slow to change. Ultraconservative organizations actively resist change. Hence the boiling pot of Europe that Luther and Calvin have lit a fire under."

She moved to the stereo, and continued speaking while she searched for a CD. "One of the areas where the church exerted its control was in the arts. Musical forms changed very slowly over the years. But as a result of the changes that occurred beginning with Luther, the influence of the church—whether Roman, Lutheran or Reformed—over music began to ebb, and musical evolutions began to cycle faster. By the 1800s, musical generations were occurring on a level with human generations. By my lifetime, musical generations were occurring every five to ten

years.

"Ah, here it is!" She picked up a CD and turned to them with a smile so filled with mischievous glee that the hair on the back of Franz's neck prickled.

"Okay, guys, one last style, one last song. I've been promising Franz for weeks that I'd explain what 'heavy metal' means in our rock and roll music, and tonight's the night. You're all along for the ride. The song is 'For Whom the Bell Tolls.'" She loaded the CD player, pushed the play button, and turned the volume up.

Franz leaned back as a bell began to toll out of the speakers, and then the speakers erupted. After his exposure to what the local band Mountaintop played, he could call it music, but it was of a type that even Mountaintop had not produced. The sounds were harsh, discordant, but there was beat, there was rhythm, there was a recognizable harmony. What impressed him the most was the relentlessness of the music. There were lyrics—he heard them—but his whole focus was grabbed by the sounds produced by the musicians.

From the beginning, he was snared by the textures. The sounds that Marla had assured him before were produced by a type of guitar—somehow combined with the miracle of electricity—had an edge to them, and edge that was like both a saw blade that cut and a string of barbed fish hooks that caught and tore. There was no virtuosity, no showcasing of a musician's skill at ornamentation. There was only pure relentlessness, pure passion, pure drive, that reached deep inside him and struck a resonance that vibrated his entire being. The song was not performed, it was executed, and he was the target of it, caught up in it, feeling nothing but the angst of the music.

After an eternity, the song gradually faded away. Franz fell back in his chair, suddenly released from the tension, feeling more drained than if he had been performing for hours. He looked around, and the others looked even worse than he felt—pale, eyes wide, breathing hard.

Marla looked around, smiling slightly, and asked, "Well, what do you think?"

"I think I've heard the triumphal march of Hell," Hermann muttered. "Nothing could have prepared me for that."

"Was that really popular in your time?" Leopold asked.

"Oh, yes," Marla said. "Millions of people, including my brother, loved the stuff. If he had . . . Let's just say that his heart's desire was to play it, and he was well on his way when he got sick."

"I liked it," Rudolf said, which provided everyone with their first glimpse of a disconcerted Marla.

"You did?"

"Yes. Oh, do not mistake me! I would not choose it to listen to all day long, nor do I think it will ever be accepted by our people—definitely not by the church. But there was a passion to it, and once you get past the harsh metallic sound you can tell that it was crafted well. We could learn about the use of discord and tension from that music."

Marla had smiled in the middle of Rudolf's comments, then started to giggle, and finally started laughing when he was finished. She calmed down quickly, wiping her eyes, and said, "I'm sorry, Rudolf, I wasn't laughing at you. It's just that you were righter than you knew when you described the sound as metallic. The band's name was Metallica."

"Appropriate." He smiled in return.

Marla stood and stepped forward a step or two. Franz watched with pride as she effortlessly

gathered their eyes and attention.

"There's a lot more that we could listen to, but the point of the evening was to give you an overview of what we called popular music to wrap up the seminar. Now, we've walked down a long road all these weeks, but you've been given a taste of what up-time music is like, the sonorities and techniques it can add to your musical palette. I don't want it to replace everything that you have. I don't want you to become imitation up-timers. I want you to be the musicians you are, but along the way I want you to incorporate what you find good and worthy from our music. Help preserve its master works, but produce your own as well. Regardless of what happens with the war, regardless of whether Gustavus Adolphus wins or loses, regardless of whether or not Grantville survives, don't let our music die."

Franz stared at Marla, standing straight and tall, eyes gleaming like blue torches, passion radiating from her like heat, and his eyes blurred as tears of pride welled up. Now she was coming into her own, now she was calling them, challenging them to follow her, to be more than they ever thought they could be.

Hermann was the first on his feet. He stepped forward, clasped her hand, stared up at her and swore, "By my name, Fraulein Marla, I am with you. If your cause is lost, it will not be for want of my best effort."

Swiftly the others joined them, hands joined with Marla's and Hermann's. "The music of Grantville must not, will not die!" Thomas thundered.

"Amen!"

Coda

Magdeburg
August, 1633

Mary Simpson picked the letter up and read it once more.

From the Desk of Marcus Wendell

Dear Mrs. Simpson
I received your request that I come to Magdeburg and become involved in the establishment of an instrumental arts program. While I am very flattered that you think so highly of me, I must regretfully decline.

What you need is a virtuoso, and even in my best days, in my youth, I was never a virtuoso. I am definitely not one now. I am good at what I do, which is take children and turn them into well-rounded educated individuals who know something about the arts and music. Every few years, I am fortunate enough to have a student or two of sufficient talent that I can guide them into a life of music as a teacher or minor performer. But that experience does not equip me to do the work you are asking of me. Bluntly speaking, I have neither the temperament nor the tools to be what you are seeking.

Having turned you down for myself, however, now let me provide you with another possibility. I don't happen to have a virtuoso in my pocket, but I perhaps can point you to

someone who can become a virtuoso.

Her name is Kristen Marlena Linder, although she prefers to go by Marla. She's young, about 21. Physically, she's rather striking. I wouldn't call her pretty—handsome is a better word. She's tall by our standards, about 5'10" or so, and she has that amazing Black Irish coloration that you sometimes see in the Appalachian hill families: coal black hair, skin so pale it's almost translucent, a dusting of freckles, and the bluest of eyes. There were girls in her class at school who were prettier, but if she was in the room, most of the boys preferred to talk to her. Marla is definitely a good example of that old cliché, the magnetic personality. And if she smiles, it's like switching on a floodlamp.

She was a senior the year of the Ring of Fire, almost ready to graduate. Musically, she was my drum major during marching season that year, and my student conductor and first chair flute player during concert season, but that's not why I'm bringing her to your attention. She is also an extremely talented pianist, easily the equal of many collegiate piano majors. But perhaps her greatest gift is as a vocalist. She can vocalize to about four and one-half octaves, maybe a little more, and has a usable range of almost four octaves. Her voice is unusual—she has the high range of a coloratura, but the timbre and power of a lyric soprano.

As an indication of just how good she is, the day before the Ring fell I heard from a college friend who is the brother of a woman on the faculty at Eastman School of Music in New York. He told me that Eastman was going to offer her a full scholarship in voice. She had scholarship offers from other universities, but as you know, Eastman is a conservatory to rank with Juilliard. The official notice never arrived, of course. I never had the heart to tell her, because she was pretty badly torn up by losing her parents and brother, and this would have made her grief just that much worse.

She finally came out of her shell after meeting some down-time musicians this year, and for the last several months has been leading what I would consider to be a graduate level multidiscipline seminar in music history, form and analysis, and piano and voice performance with several down-timers using nothing more than a couple of old college textbooks, encyclopedia entries and liner notes from classical music recordings. They're all young and arrogant, of course, but she has not only held her own with them, she's earned their respect, to the point that they have basically accepted her as their leader and mentor. I don't have to tell you just how unusual that would be in our time that was. I am almost in awe of it now.

Mrs. Simpson, if a music teacher in my position is very fortunate, perhaps once in his lifetime he finds a student who can soar to the highest heights, who can become one of the stars in the musical firmament. For me, that once-in-a-lifetime student is Marla Linder.

Allow me to present Marla to you as a virtuoso in development. I believe she is the best solution available for the situation you have described. I also believe that if you were to provide to her the guidance that I cannot, the guidance on how to be a virtuoso among virtuosi, then her potential will be realized, to the enrichment of the world we now live in and the joy of those who know her.

Sincerely,
Marcus Wendell

Mary put the letter down on her desk, and tapped her finger against her lips, thinking. Marla .

. . a woman . . . She must be a truly remarkable young woman, to have brought forth such a paean from Marcus Wendell. She hadn't had much contact with the band director during the Simpson's relatively short stay in Grantville, but he had impressed her as a direct, outspoken man who would usually call a spade a spade. If he judged her so, then she must be good.

One of the things that Mary had been wrestling with was how to get up-time music somehow disseminated among the down-timers. That was the cornerstone to the plans she was even now trying to formulate for building an arts program in Magdeburg. An imperial capital deserved the best: opera, ballet, a symphony. Spreading the musical knowledge that she knew was available in Grantville had to happen for any of those programs to be sustainable.

The irony did not escape Mary that, even as she struggled with how to begin such a process, it had happened without her. With a quirky smile, she reminded herself that the world did not revolve around her. In fact, she'd best pull up her stockings and hustle if she wanted to guide this particular parade.

Mary reread the portion of the letter where Marcus described what Marla had done. A bond between an up-timer and down-timers, based on nothing more than the common love of great music. How remarkable.

Marla . . . a woman . . . Her thoughts repeated themselves. Mary liked the thought. She had never considered herself a feminist. In her college days, she had known plenty of fem-libbers. Some of them had become very impressive women in their maturity—she'd allow, albeit a bit grudgingly, that Melissa Mailey was no one to sneer at. But many had later morphed into the types who seemed to do nothing but whine endlessly, fund litigations over every perceived slight, and extend "political correctness" into even trying to revise the Bible to remove gender references to God. She'd never had much sympathy for them.

On the other hand, she *had* quietly encouraged John to ensure equal pay for equal work in his industrial plants. She'd always been of the opinion that if they were given a level playing field, women of any ability would do well.

Mary laughed to herself, almost wishing that one of those so-called radicals had been caught in the Ring of Fire. That would almost have made what had happened worth it, to see one of them caught up in the truly patriarchal societies of the seventeenth century. She would really have enjoyed seeing one of them square off against some of the down-time ministers. Melissa Mailey could stand her own against them, certainly, but most of the ones Mary had known in college would just run for cover.

Shaking her head, Mary returned to her thoughts about Marla. The more she thought about it, the more she liked the fact that a young woman had become the center around which this group revolved. Under her aegis, perhaps this young woman could serve as a dash of cold water in the face of the smug musicians she'd met so far, the ones who were just parasites on the coats of the *Hoch-Adel*.

There had been conflicts between up- and down-timers on many fronts. In the early days of the naval yard, John had more than once spent an evening raving about problems caused by hard-headed Grantvillers and hard-headed Germans both getting wrapped up in their pride and arrogance. She didn't delude herself that it would be any different between the court musicians and Marla and her young lions. But the fact that Marla was a woman would perhaps keep the "old school" off balance.

She sat up straight. Decision made—invite Marla here. Why not? If she was that good, she was worth bringing in as a performer. If she could in time become something more than that, well

. . .

Telegram? No, too impersonal. This needed a human touch. She pulled open a drawer and took out a sheet of cream-colored paper—they did make such nice paper here-and-now—and uncapped her fountain pen.

Dear Miss Linder,

My name is Mary Simpson, and I am writing to offer you an opportunity . . .

Euterpe, Episode 3

By Enrico M. Toro

To Father Thomas Fitzherbert SJ,
Illustrissimus Collegium Anglicanum
Roma

From Maestro Giacomo Carissimi,
Grantville, USA
Seventh day of October, in our Lord's year 1633.

Dear and honored father,

How are you? I received your letter today. It was waiting for me at the Church of Saint Mary. I'm glad to know that you came back from Naples and that the Mediterranean sun and the sea breeze improved your lungs more than all the bleedings and enemas of "those damned Italian doctors." I'm also glad Count Malvezzi di Roccagiovine is paying for the publication of your last treatise. I'm sure the Venetian printers will make a wonderful job as ever.

I knew you would be worried about my soul and my well being, but I like to think that my soul is still in the grace of God and I am fine. Tired, yes, but very happy to be here. You must really have strong doubts about the strength of my faith if you think a few weeks in Protestant countries can damage my beliefs so much. I committed sins, true, as anybody else in this world, but for all I am learning here I'm prepared to spend more time in Purgatory. It is really worth the price.

I know my English is still a long way from being perfect, but I thank you anyway for having read those "long pages" of mine and for having given me many hints on how to improve myself. Nevertheless, everyday I spend here helps to improve my language skills. Maybe, in a not too distant future, you won't find my prose too hard anymore.

You have asked me to satisfy your curiosity about Grantville and the Americans. I plan to do so while telling you about the events of the last weeks.

The day after I wrote you my last letter we decided to begin our stay in this town with a visit to Father Mazzare, the man Milord Mazarino referred us to. So we took our horses and rode to

the Church of Saint Mary.

The crowd cramming the paved roads of Grantville showed us a place teeming with activity. Do not believe rumors about uncanny magical devices. As a matter of fact, just like in the rest of the world, most of the people walk to their destination. A few, like us, use horses; others use a small iron device called a "bicycle" that uses human power to move people as quickly as if on horseback.

I couldn't see too many of those motor vehicles now famous throughout Europe. I've been told that they are now only used for public service or emergencies. The ones I saw here were certainly impressive: bigger and sturdier than coaches and faster than the fastest horse.

The most impressive sights of them all, I believe, are those flying machines called airplanes. Seeing them climbing to the sky and navigating through the clouds is truly a tribute to the ingenuity of man.

Grantville is certainly a town of marvels, but not the ones a normal person could expect. You won't find here cathedrals and palaces like in Rome, Florence or Venice. Grantville marvels are others, big and small.

I included in the letter a small example of such marvels. It is called photograph and it is literally a drawing made using light. The device that produces it, a camera, captures the light in a series of lenses and prints it on a special paper that has been dipped in a combination of alchemical materials. As you can see, it depicts reality much better than any drawing can do. One can only wonder how many painters will be able to earn their bread with portraits when this device will be used diffusely in Europe.

I really wish the world wasn't at war, because I believe this town is a gift of God to mankind. It should be preserved and guarded like the most important treasure we have; we could all learn. Any student of what they call their "high school" knows more about science than any member of the *Accademia dei Lincei*. One could live here thirty or forty years and still learn something new.

Probably the greatest marvel of all is the Americans themselves. They claim to be common people and, like common people, they don't disdain any kind of hard physical labor. Nevertheless, their knowledge and skills are astonishing.

Even if the Americans claim to be all commoners, their government seems different from the republics of the past, because it manages to involve all the citizens and to avoid the creation of a ruling oligarchy. This is a Roman republic without patrician and plebeians, Dante's Florence without *popolo grasso* and *popolo minuto*. Or, more accurately, this is a place where social distances are less evident than everywhere else.

Americans are strong advocates of what they call separation of powers (executive, legislative and judiciary) and they use "checks and balances" (one of their favorite phrases) to keep this separation working.

These people don't want guidance by a king because they think every man is born with the same rights of a prince. Each of them is a ruler of his own and a potential head of state. And, just like our kings and princes, they are stubbornly attached to their own personal rights, which, they believe, are received straight from the Omnipotent. They are ready to fight and die for them as are few other people I've ever met in my life.

They have made almost a religion of their own personal liberties. Freedom is venerated here as if it was a pagan deity of the old times. It is a semi-official state cult, the American version of the Romans' Capitoline Triad. They call this goddess "Lady Liberty" and I wouldn't be surprised

if in their homeland they raised statues and temples to her.

It is probably for this passion that their laws and customs make this group of individuals work and live together. Each member of this nation can have a saying about how the government should be conducted. Surprisingly, this doesn't bring chaos, but unity and what they call "law and order." Many of them believe that disagreements and diversity of opinion are not seen as a threat, but as an opportunity to improve the wisdom of their decisions through discussion. From what I've learned about their history, I may say their republic in America was the most successful and powerful one since the times of Rome.

I hope my simple words may enlighten you on some American customs, but I am a musician, not a philosopher. I am sure people more entitled than me will write numerous and more knowledgeable tomes about the American society. Books that will help you understand this place much better than my humble ramblings. So, instead of wasting any more paper, let me return to my adventures.

Saint Mary's simplicity and small dimensions would surprise you. At a first glance you would think it is a very poor rural church, but you would be wrong, because in that church there are more books and knowledge than in many of our cathedrals.

Even without all the paraphernalia and privileges that are common in our clergymen, Father Mazzare is definitively a man of God, a true pastor of his flock.

He received us in his office. The room was quite simple and spare but for the huge amount of books and a wooden crucifix on the wall in front of his desk. I was captured by a large picture on the wall. It was a photographical representation of the pope who was the head of the Church in 1999. You will be surprised to know that he was—will be, perhaps I should say—Polish, the first non-Italian pope in many centuries.

Apparently the Catholic Church at the end of the twentieth century is quite healthy and spread all over the world. (They told me there are African cardinals and Chinese bishops!) But from what I later learned it has changed much from the one we know now. A council in the twentieth century stated that all the rites and the Bible must be translated in local languages and supported many other changes. Somehow the Church has become more similar to the Reformed churches. Oh, don't worry. They are not heathens. Priests are still not permitted to marry, even if this has become an issue in many sectors of their time's church. I know that Father Mazzare is preparing a compendium on the Catholic doctrine of the twentieth century, and I suspect that soon you will receive a copy of it from the father general, so I won't waste more time on this topic.

After we introduced ourselves, we gave the parish priest Monsignor Mazarino's letter of recommendation and explained our intents. There was a bit of confusion, at first, because it seems that the monsignor is known in Grantville as "Mazarini." But once that was clarified, Father Mazzare listened carefully to our words and then suggested that the place that would offer us the better chances to learn about future music was the school. There I could find most of the material I needed, like music recordings, music sheets and modern instruments.

He asked me if I spoke Latin and if I was interested in teaching Italian and Latin at the school. I told him I had more than ten years of experience in teaching and I could help teaching music, too.

"I can do that for free, as a token to have access to such an amount of knowledge." I added, "I have financial resources of my own."

"Perfect, maybe we can find you a job; especially if you don't mind not being paid. But there

is an important issue here. Do you have any problems in having female students and working together with female teachers?"

He must have seen the barely contained surprise on my face because he explained another thing that makes this place so unique. Here women have the same rights as men. They receive the same education, have the same jobs and they can, if they want, enlist in the army.

"I would do my best," I answered. "After all, if I want to stay in this town I must learn to not have any preconceptions about what I find alien and new."

"When in Rome . . ." Father Mazzare told me, smiling, in his very good Italian free from any regional inflexion.

I must admit that, despite some moments of shyness, embarrassment and clumsiness, due mostly to my absolute inexperience in dealing with women, that later I found that many of them are better students and better musicians than their male counterparts. Here ladies like Vittoria Colonna or Artemisia Gentileschi are not the exception, but the rule.

With us still in the room, Father Mazzare used another of those amazing American devices called the telephone and called the high school principal. The telephone, familiarly called phone, someway converts voices and noises in an energy similar to the one of lightning (of which the Americans are masters) and sends it to another of those devices even at a very long distances. If we both had a phone and there was a line between Grantville and Rome we could talk to each other like we were in the same room. Awesome! Or, when said like some of my students do, totally cool!

Once the phone call was over, Father Mazzare told us he had scheduled a meeting for the day after and offered to come with us to the school. Then he asked if we wanted to take a walk with him in the afternoon, sort of a guided tour to Grantville. Finally, he invited us for lunch.

"I'm quite busy with other chores this morning, apparently Tino Nobili can't wait. But, maybe, I have something to keep you very busy with while you wait. Something I've no doubt you'll find quite interesting. Please follow me."

So he led us to his small apartment and offered us something to drink. Then he showed us one of those music playing devices Monsignor Mazarino told me about when I was still in Rome.

He pressed some buttons on it, took a small box with the name "Gloria, Music for Worship and Praise" printed on the lid and extracted from it a shiny circular mirror with a hole in the center. We finally saw a compact disc. The priest invited us to sit, put the CD in a black box and pushed another button. In a few seconds the room was filled with the notes of a composition named "Gloria" by a musician of the future named Antonio Vivaldi.

Thank God for the chairs we were sitting on. I have had months to somehow prepare myself to the richness of the music and still I was so stunned, dazzled, and inebriated that I'm not sure my legs would have been able to sustain my body.

I don't think I will ever forget the expression on Girolamo's face and the tears on young Johannes cheeks while they were listening to these engrossing and sophisticated harmonies. Harmonies created by people born in another time and in another universe. The names on the CD box said the composers were Bach, Handel, Mozart, Faure, Elgar, Bruckner and many others.

We immersed ourselves in that music for hours, playing it over and over again. There was no reason to talk among us because the music was communicating more than mere human words could ever have done.

In all this musical rapture, I felt a little worm gnawing at my mind. I could not stop worrying

about how difficult it would be to adapt my knowledge, my skills, my tastes and my style to this new world. In just one CD there were hundreds of sounds, harmonies, tones, chords and instruments that I never heard before. More than ever, I understood how much study and application this research would require. Again, I felt my confidence shattering. Was the task I had given myself too Herculean for a single man?

This worry had darkened my mood enough that I was glad when Father Mazzare came back and stopped the music. Part of my gloomy thoughts vanished as if his presence had exorcised a dark spell put on me. The silence was broken, we could finally talk and we didn't have to remember to breathe anymore. It was time to think about more mundane matters.

It didn't come easily, I promise. In a single morning we had seen enough marvels to keep us busy talking for a long time. We were simply overwhelmed, drunk of Grantville. Often we feel like a group of new Marco Polos exploring the marvels of the Great Khan's Palace.

The lunch that followed, so full of answers and questions, brought us other surprises. We discovered that we didn't have to use our forks and knives to eat as they were already set on the table as thought it was a very ordinary act. Everybody here has more than one set of silverware and uses it daily. Then we ate Neapolitan *maccheroni* enriched with a dense, flavored red sauce made of *pomi d'oro,* the vegetable Americans call tomatoes. Father Mazzare was particularly amused by the idea that we were among the first Italians to eat homemade fettuccine with a tomato sauce.

I wonder if every one of us born in the seventeenth century has the same moronic look when they see Grantville for the first time. I am prone to think it is a common reaction and the Americans are not only used to it but definitely amused by it.

In the afternoon we finally made our stroll around the town. We were introduced to many parishioners met along the road, up-timers and down-timers alike. We were shown the hospital, the town council, the other churches, the stores and the other places we could use during our sojourn. We paid a visit to the bank where we used the letters of credit we brought to open what they call checking accounts. Then, following the priest's advice, we went to the local constables' headquarters where we showed our papers and made ourselves known.

It was evening when we finally finished our tour and took our leave.

While we were putting the saddles back on the horses Father Mazzare said, "Maestro, I suppose I'll see you often in church."

"Certainly," I replied.

"I'd love it if you could help me with the church chorus and maybe sometimes play the organ. It's not one of the big ones you must be used to playing, but I'd really appreciate having a professional like you offering his services to the community. Besides, this can be another useful approach to learn the sacred music composed after your time."

"It would be an honor for me, and a pleasure. I may start at your earliest convenience."

"Well, three days from now the chorus has its weekly rehearsal. Why don't you come and start getting accustomed?"

"I'll be there, Father." I said. "After such a show of kindness it is the minimum I can do for you."

The following day we met the priest a second time to go together to the high school. I was very tense and nervous because I knew that much of my research depended on what would happen that day.

Despite my tension, I didn't fail to notice that Father Mazzare was carrying two large volumes: one was named *The Catholic Encyclopedia*, the other was *The Encyclopedia Britannica*. When I asked why he was carrying such a heavy burden, he made a sibylline remark.

"Oh, this is your resume, Giacomo!"

Apparently the priest's trick worked, because, as the Americans say, I got the job.

Once in the presence of the school's principal, Mr. Saluzzo, another American of Italian origins, Father Mazzare introduced me and explained for all those present the reasons I was there.

Mr. Saluzzo seemed interested, but he began soon questioning me about my teaching experience, my knowledge of Latin and the events of my life. One of the things he was concerned about the most was my ability to teach in English.

The principal is a serious man, very competent in what he does. I'd say that, in another world, he would make a perfect member of the Company. Our discussion was all business and I soon found myself under a landslide of questions. I had to defend my position with more resolve than Horatius Cocles on the Sublician Bridge.

Americans are practical people. When they build something they first make sure it fulfills its goal and then, if it is possible, they make it beautiful. So it is for the high school. Its buildings are plain, Spartan, almost naked for an eye used to the frippery of today's architectural style, but they are perfectly designed to carry out the functions they are destined for, to teach and to learn.

The students have all the space they need, and an easy access to many important facilities. Everything is at hand, classrooms, refectory, theaters, fields where to exercise the body, alchemy rooms, music rooms and, last but not least, a library that seems to come out of long-forgotten myths. A fabulous place for the number and for the stunning quality of many of the books.

With such a vast amount of resources, I am not surprised that the school's curriculum of studies puts to shame even the best Jesuit collegium. And I know, personally, many members of the Company who would give an arm and a leg to be able to use such a formidable array of teaching tools.

I believe that the prelates who are actually serving at Saint Mary are not the only members of the Company we will see around here.

Girolamo seemed particularly impressed by the physical exercise area they call the "gym." I could see an idea was growing in his mind. So I wasn't surprised at all when, days later, he asked the principal for his permission to start a fencing class in the school. His main argument was that having students learn the arts of self defense would help in case of another raid, but I believe he is secretly pleased to teach fencing to people anywhere he goes. As usual, Girolamo's enthusiasm was highly contagious and Mr. Saluzzo accepted, on the condition that Girolamo would help buy the materials needed for the class.

Finally, in the late days of August, I was able to begin my duties at the school.

Teaching was easy. After all, it's what I've been doing in the last few years in what is considered one of the best schools in the world. Latin gave me no problem. You start with *Rosa*, *Rosae*, *Rosa* and Phaedrus and, in a few years, you end up reading Augustine of Ippona. And I have the crucial help of Mr. Cassels' Dictionary and many other schoolbooks I would be pleased to have copied and sent to you, should you find them useful.

My problems were more with the grading system and all the rules followed by the American school. Nevertheless, with the help of my colleagues, I ended up mastering that as well.

After the first few terrible, awkward days I also managed to get along well enough with the

gentle sex's students and teachers who are crowding this school.

I think Girolamo had more problems with that than I did. When he started his classes he would never have believed that so many of his students would have been women. Considering how dashing he looks and how egomaniacal he is, I wasn't surprised when one day he confessed to me that he never felt so many eyes trying to strip him naked as in that first day of classes. He says they call him "Mr. Banderas," but he has not understood why yet. Anyway, I believe the thing grew on him. Now he likes to boast that he will make the finest duelist of Europe of one of those girls.

I suspect that his prejudices vanished once he discovered that, in the late twentieth century, Italian female fencers are considered the best in the world with a light blade. National pride may be useful sometimes!

Next week I will begin to teach a small group of students about Italy. I really would like them to learn more about its history, its customs and its lore, its language and its literature. Despite the fact that so many Americans have Italian origins, they don't seem to know much about my land. To teach this class I had to do a thorough research of all the material on Italian history present in the library, which is not much anyway. In the end, I will have to use mostly my notes and some material I found in Father Mazzare's personal library.

Apparently, in the up-time USA, Italy disappears from the map at the end of the Roman Empire, makes a small reappearance at the beginning of last century (Leonardo, Michelangelo, Raphael), and then simply vanishes until the mid-twentieth century. They know Dante's *Commedia*, but they have almost no clue of the context the poet was writing about.

When I am not at work I spend most of my time studying as I plan to tell you later. We managed to sell our horses and make a good profit on the sale. At the same time we rented a big house on the outskirts of town. It is an old house, by American standards, that has just been renewed. There is plenty space for the three of us and a couple of German valets we hired to attend to our necessities.

The basement of the house and a roofed space called "the garage" are big enough to let Girolamo set his temporary shop there. On a day in early September, escorted by a small group of apprentices who work for Johannes' father, the timbers we ordered in Fussen on our way here finally arrived. The quantity was big enough to fill the basement. Since that moment, the shop has been working almost around the clock. The house is always full of noise, and we all look as busy as bees in summertime.

We aren't the only Italians in town. The trades here employ mostly Germans and Americans, but there are a few merchants coming from Milan, Venice and Genoa. One of them is particularly envied. He managed to sell a huge quantity of a blue fabric that is made in Genoa with Egyptian cotton. The Americans are particularly fond of it.

I believe that in the weeks we have spent here we have managed to create quite a comfortable life for ourselves. We have made a few acquaintances, built a trade and found many interests to pursue. I don't want to sound vain, but I am quite proud of our accomplishments.

What about the music? You may wonder. Well, this is the part of the letter I have more problems with. It's very hard to describe the things, the sensations and the problems we have had, especially in a foreign language. But I presume this is all part of the game so I will try nonetheless in the following lines.

In my first letter I told you I felt like destiny wanted me to meet Euterpe, the muse, in

Grantville. When I wrote those words I thought I was using a metaphor. But now, I believe instead that my muse is incarnated in a real woman.

It happened during our first visit to the auditorium. I remember it as if it is printed in my mind.

Imagine a large hall, the size of a medium church, the floor filled with seats. Imagine this hall empty, but for one woman playing on the stage at the other end of the hall. Imagine a beautiful, black, large harpsichordlike instrument emitting a simple, but very expressive music. Imagine notes rich in timbre and tonality, powerful and delicate at the same time and all linked together in a way I find hard to describe. Forget monody and basso continuo, surround yourself in strange dissonant harmonies, in an exotic perfume for the listening.

If you can do that, you will not be surprised then that, when Mr. Saluzzo began to say something, both Girolamo and I dared to show him the apparently universal sign to make silence. He understood.

The music lasted for just a few minutes. The woman on the stage seemed so engrossed in it that she did not notice us until the very moment the last note faded away and we exploded in a sincere and enthusiastic applause whose sound made her turn toward us. She giggled and blushed like a child caught in something that is very personal and, at the same time, something she was also very proud of.

She made a little bow, left the stage and came toward us. We were still completely enthralled by her performance.

Usually Americans tower over us down-timers; instead this woman was considerably shorter than me, her figure pleasantly full. The well-defined oval of her face is framed by long chestnut hair and underlined by beautiful, shiny, amber eyes. She moves with a natural grace that is very different from the affected grace of Italian ladies. That grace, especially when combined with her outstanding self-confidence, is equally impressive.

One of the first things I learned here is that outer looks are not so strictly an indicator of social status and morality as it is among us. This notwithstanding, it will take time to become used to the way women dress here. I am still uncomfortable when they wear pants or skirts short as the one Elizabeth was wearing that day. The whole lower part of her legs was visible. In Rome a view like that would at least cause a scandal. Here it is normal during warm days.

"What were you playing, Elizabeth?" asked Mr. Saluzzo

"Two of Satie's "Gymnopedies." I found the sheets a month ago at Mom's and I always wanted to play these pieces. They seem so simple and yet they are so incredibly expressive and touching. But why don't you introduce me to these gentlemen, Victor? I'm glad they appreciated the music."

"Gentlemen, may introduce you to Mrs. Elizabeth Jordan, our music teacher?" said the principal, while Elizabeth made a small, very gracious bow.

When addressed Girolamo answered with a very gallant bow enriched by a killer smile that he had probably used many times before. I made a fool of myself.

I have spent all my adult life in the bosom of the Holy Mother Church. I am without doubt very shy and not accustomed to talk to women, but I should have done better.

When Elizabeth stepped toward me saying "Nice to meet you, Maestro Carissimi," I answered something like "grfzgrrrrrrr," feebly and looking for cracks in the floor.

I never felt so awkward in my entire life.

Girolamo's eagerness saved me from worse shame.

"So that is a piano," he said, speaking slowly and trying to find the right words. "The sound is . . . *magnifico. C*an we please listen to more music?"

"Please, milady," I added, finally able to speak. "Forgive my clumsiness. Your performance left me completely dumbfounded, and I'm eager for more as well."

Once we arrived closer to the piano Girolamo could not help but touch and caress its smooth lines with an intensity probably reserved only for the best of his mistresses. He was staring intently at the actions inside the lid and, I think, mentally checking the differences between this instrument and spinets and harpsichords. He suddenly stopped looking the jolly fellow I knew. I've never seen him looking so serious. His gaze was saying "Whatever the costs, I have to learn!"

"This is what we call a grand piano," said Elizabeth. "It is five feet long. A full concert piano is longer, usually around nine feet. In our timeline, the first piano was built in Italy in 1709, I think. But it took many years and many other innovations before it became the instrument you see right now. The main difference between a harpsichord and a piano is in the actions. Instead of plucking the strings, pressing a key makes a hammer strike them. The instrument makes possible a broader melody. A phrase can grow louder and then softer and accentuation is possible. Nevertheless it took almost a century before pieces were composed with the piano and not the harpsichord in mind. Almost a century passed from Cristofori's piano to the introduction of pedals."

Looking around, she saw how carefully we were listening to her words.

"Oh, I wish all my students were like you!" she said, smiling deliciously.

"I think you will find plenty of theory in our books in the library, so let's be done with it. I'm going to play a classic piece. The very one almost any beginner learns how to slaughter in the first year of his studies. It's called "Für Elise" and was composed by a German named Beethoven. If you really want to learn about our music, Maestro Carissimi, you will have to deal with him. If you like it I will then play another piece by the same author, the "Moonlight Sonata."

"I am eager to begin, Milady," I managed to say.

And so, after a short pause needed to reach the opportune concentration (a gesture that apparently is common among artists of any time and place), she began playing again. I couldn't stop watching the way her hands moved skillfully on the keyboard. The sound was so strong and clear that Girolamo had to restrain himself from putting his head into the soundboard.

I had the impression that learning how to play a piano would not be too hard. In a few months, I felt, I should be able to play it as well as any other instrument I mastered. After all, I'm quite a virtuoso with organs and harpsichords. The biggest obstacles will be learning how to use the pedals, getting familiar with a seven octaves keyboard and learning how to control my touch, as in a piano the way one uses the keys affects the sound much more than in any instrument I played before.

The more I listened to the music, the more I began to understand how much this instrument could impact the way music is composed.

When using harpsichords, one has to be true to certain forms. Creation is limited by well-defined boundaries. Using a piano instead gives the composer the opportunity to use many more combinations and harmonies. The richness of those legati and arpeggi! The ways chords escaped from the instrument and seemed to fill the hall reminded me of the flocks of starlings that pass trough the sky of Rome every autumn. The power of this music is outstanding. Mastering this

instrument will give any musician a creative freedom I thought impossible before.

Someone aware of my prejudices against female musicians may laugh when he discovers how much Mrs. Jordan helped me. But probably one cannot have a good learning experience without having to set aside many of the ideas they were considering a given.

Mrs. Jordan, Elizabeth, has surprised me almost every day since the first time we met. She is a good natured, intelligent, ironic woman; a woman of profound faith, even if not Catholic, a talented musician and a very good teacher. Once the initial embarrassment was gone, music brought us together and I am proud to say we have become very good friends, as close as decorum permits.

Her husband, a high ranking constable in the city guard, works as liaison with the constables of the other United States towns. So he spends most of his time out of Grantville. I don't know how much this bothers Elizabeth, because up to this moment I never felt comfortable and close enough to ask and she doesn't talk much about it. But, sometimes, I had momentary glimpses of how much she misses her husband.

They have two young children, Daniel and Leah. They are very lively, spirited and curious as any child should be. They are clearly a big part of her life and the sound of their games has been a pleasant background in the many afternoons I spent at Elizabeth's studying.

As you may have guessed already, Elizabeth has become my guide, my mentor, my teacher. I am not sure what I would have done without her.

I am not the only musician who is trying to learn something about the new music. Nothing truly surprising considering what treasure up-time music is. One of Mrs. Jordan's previous students, Miss Marla Linder, is teaching a group of German musicians, all very skilled I must add, and she let us borrow some very useful notes.

If the Germans are very good, Miss Linder is simply surprising. She has the flame, and I believe she will become famous very soon. She is still a little rough in some passages, but her talent is unmistakable and, being so young, she has huge room for improvement. With the right exercise and care, her voice will shine like gold.

We met the first time during an August afternoon in the school choir room. Elizabeth invited me to participate in a discussion that Miss Marla was having with her German friends. The topic was mainly "tempering." You see, temperament of keyboard instruments has changed a great deal in the course of history.

Many methods have been used in the attempt to produce pure octaves and pieces of music written in different eras have a different intonation. So, knowing the differences between the mean intonation we use now and the others is crucial for us.

Most of the music from the middle of the nineteenth century until the Ring of Fire, was written with equal tempering in mind and most of the music written in the eighteenth century was written using "well tempering." If one changes the original intonation, they necessarily change also the composition's harmonic organization, thus producing something different from the original music.

I appreciated how clearly Miss Linder touched such fine points in music theory. I believe she will make a fine teacher in the future, a rarity among great performers.

I didn't say much at the meeting. I just pointed out that as things are now, there are no standards in music, not in pitch. The pitch I am used to is higher than the pitch of the twentieth-century instruments and much higher than the pitch mainly used here in Germany.

I tried to explain that, for the moment, we cannot expect standards and we should do as we down-timers are already used to: a lot of transcribing when our music is played in a place whose habits are different from the ones of the place where the music was originally written.

In the following weeks I went to other meetings, and, with time, the ice was broken. Music helped to create a true camaraderie of musicians. Sometimes we simply escaped the many stresses of modern music and spent many evenings playing the notes we knew better, exercising in what our teachers call "Baroque jam sessions."

Even though Marla Linder played the first note, it was Elizabeth Jordan who took the brunt of my musical education. She set a very strict program of studies. From Monday to Friday after school we study piano for two hours, then I have my class of music theory and history. On the weekends I have to spend hours doing my "homework," exercising, studying and listening. Any Monday I have to be well prepared and pass a test on what I have done the previous week.

Since I began I've read plenty of books and I have been listening to hundreds of recordings. We decided that the better way to understand the evolution of music without being overwhelmed by so many authors and styles was to follow a strict chronologic path: late Baroque, Classic, Early Romantic, late Romantic and Modern periods.

The names of the many giants that should have lived after me are printed in my memory just like my daily rosary: Albinoni, Corelli, Geminiani, Johann Sebastian Bach, Lully, Scarlatti, Vivaldi, Handel, Pachelbel, Beethoven, Haydn, Mozart, Brahms, Debussy, Liszt, Mendelssohn, Schubert, Faure, Mahler, Smetana, the Strauss family, Tchaikovsky, Bellini, Bizet, Cherubini, Leoncavallo, Rossini, Puccini, Verdi, Wagner.

For each one of them I have to learn the different styles of their compositions: fugues, concerti grossi, sonate, symphonies, symphonic poems, waltzes, overtures and so on.

Some nights I dream I am in the center of a storm with music sheets twirling in my mind like leaves blown by a gale. I can only hope that when the wind stops blowing the leaves will fall in a pattern I can understand.

Three weeks ago, after an afternoon spent trying to make sense of Chopin's Opus 64, when I was feeling more frustrated than the dog chasing his tail the Polish composer was trying to depict, I asked Elizabeth why she was sharing this gargantuan task with me.

"See, Giacomo, when I first met you, I am ashamed to say I didn't know who you were. After you left I had to go look for your name in my college schoolbooks and in the library."

After a short pause she smiled and said "I know you don't want to read of what your future would have been in the timeline I come from, but I can at least tell you had an important role. Without you the music I know and have loved since I was child would have been different. I felt like I owed you a great deal. I also realized that, with you, I had to set the bar high, very high, so high I was afraid I could not even reach it. It was a challenge I could not resist."

Looking me straight in the eyes, she kept on, "I am new in this profession, Giacomo. I became a full-time teacher only after the Ring of Fire. I had to know what I was capable of and you were, are, the perfect challenge for me. Like your friend, Girolamo," she smiled again with that subtle smile that warms my heart, "I never leave a challenge go untouched. And believe me, no matter how hard it is trying to teach something to that stubborn head of yours, working with you has always been a pleasure."

I believe I became as red as Father Mazzare's tomatoes in August. But her resolve gave me another reason to not give up. I want her to be proud of me more every day.

After the invention of those devices that make it possible to listen to somebody play or sing even if they are long-time dead, one can listen to music in two ways: recorded music and live music.

Even if I had my share of the first kind, I've always preferred the second, because seeing who is playing with my own eyes makes my down-timer mind much more comfortable. Luckily, I found plenty of live music in the town of Grantville.

One may think that together with all the things they are busy producing, with the reorganizing of the German political structure, and with a war about to be declared, these Americans would barely find the time to sleep. Instead, they love to make music. And they do it plenty and well.

Music of all kinds, from the sacred hymns they play in their churches to the ballads sung by the common people. They have many genres: rock, blues, jazz, folk, country, soul and many others. Honestly, I am not able to describe my reactions the first time I heard that awful music called hard rock. But after that concert at the Thuringen Gardens, I understood perfectly how the hardened Spanish soldiers at the Wartburg could have been terrified by it.

Put a hard rock band behind me and even I, Giacomo Carissimi, your most peaceful musician, would gladly march to battle against any enemy just to put that noise far behind me. Some of the oldest Americans are sure that rock musicians adore the devil. I am prone to agree with them.

One of my favorite activities is listening to the high school band, what I call Mr. Wendell's kingdom. This is for the skill that this teacher has in dealing with his young students.

Their existence is a proof that the Jesuits were right in making the study of music such an important subject! They are simply spectacular. They use mostly wind instruments that are very different from what we are used to. These instruments use a device called a "valve" that regulates the flow of air in the instruments. This permits the players to play in all keys and produce richer sounds compared to what we are used to. I do believe, though, that the sounds are more apt for a battlefield than for a church. Nevertheless, seeing so many boys and girls learning how to play, and making so many efforts to be able to play together in harmony makes the teacher in me feel very happy.

Not many of them will become professional musicians, but, whatever the path they will take, the study of music will enrich their lives and will give them a key to see the world with.

Since the moment of my arrival, I have come to enjoy the relative peace of any moment I spend in St. Mary. Any time my busy days permit it, I try to find refuge and consolation inside its holy walls. When not in prayer or meditation I have long and useful conversations with Father Kircher SJ, whose reputation in the Company I found very well deserved. I recommend to you this man of rare insight, logic, savvy, wisdom and compassion.

I found a subtle pleasure in using my experience as master of chapel for the people of St. Mary, and I deeply regret not to be able to spend more time helping with the sacred music during the different services.

When I began participating in the choir rehearsals I was afraid that my arrival could have caused some jealousies, but I was proven wrong. Both Mrs. Linda Bartolli, the organ player, and Mr. Brian Grady, the director of the choir, did their best to make me feel at ease and part of the community.

At the end I think that, when working with them, I am receiving as much as I am able to give. I treasure the opportunity to learn more about the sacred music written in times and places that weren't my own. I have also learned to appreciate the mechanical wonders that are up-time

organs whose mechanical and pneumatic parts are all powered by electricity. It's incredible the kind of tonal flexibility one can achieve with such a small case.

Many of the people who believe that after Pretorius' *Syntagma Musicum* the organ cannot be improved will be seriously disappointed. Linda once told me that the greatest honor for an organist is to play on an instrument built by an artisan named Silbermann whose organs will maybe be built more than fifty years from now. I am sure it is true, but I am well satisfied to play the one they have here in St. Mary.

Just recently, we decided to stage a concert for Saint Stephen's day with a program of down-time and up-time music. I look forward to the event.

While I was busy with my music studies, Girolamo and Johannes didn't remain idle. Their plan was first to learn all they could about pianos, then to restore a few of them and only at that point, once they had learned where they could get all the materials they needed, to start building new ones.

Pianos come in different dimensions and shape: there are the upright pianos, whose soundboard and strings are in a vertical position, made to be used in normal or small places. There are the baby grands, similar in shape and dimensions to an harpsichord, that require, for a perfect sound, a larger room, and then there is *non plus ultra* of instruments, the concert grand, whose sonority makes them perfect for concert halls.

Girolamo bought a few upright pianos, some of them in very bad shape, and two baby grands. People had begun to realize the value of those unique instruments and even if buying them was a true bleeding I never saw my artisan friend pay such a sum so gladly.

Quite unexpectedly, he managed to find a grand piano in a place called the Bowers Mansion. This villa, that used to belong to a rich family here in Grantville, is the closest thing to a *palazzo* the Americans have and it's now used as the administrative center for the region. The piano was left abandoned just before the Ring of Fire when the last member of the Bowers family died.

Buying the pianoforte has not been as easy as Girolamo believed. Some of our German friends have decided to start making modern instruments and the grand piano was a terrific asset for them as well. The purchase became a ferocious bidding between the two parties. I was afraid Girolamo was about to have an apoplexy when he paid the final sum, but, thanks to the glory of Venetian ducats, still the best coin in Europe, he managed to bring the piano home.

The piano must weigh at least eight hundred pounds and is made by an American craftsman called Steinway. It is totally black, made in walnut, spruce, birch and poplar. The harp is made of iron and the strings are of the finest steel and brass.

The piano had been visibly neglected in the last years The frame was scratched and dented, one of the legs broken and clumsily patched, some of the actions were broken and some other (together with a few of the precious strings) were missing. Despite this, the instrument was a sturdy one and Girolamo is still very optimistic about giving it a second life.

The night the piano arrived at the shop Girolamo seemed very concerned. He was worried about an inevitable rise in costs brought by a competition on all fronts with Hans Riebeck. So, the same night, he invited all the partners of Bledsoe and Riebeck to the Gardens and he tried to convince them to form a commercial alliance or, at least, to "divide the cake" to use a very colorful American phrase. Girolamo's offer was to cooperate to get together all the materials they might need instead of fighting for them. He was adamant about the rightness of his idea and he spent all night trying to talk his competitors into it. The Germans did not agree right away, but

they looked very thoughtful when we left. I am sure that they will see the sense of it.

Since then Girolamo has been working frantically. I've seen him disembowel uprights and lay all their components on the huge table in the large garage. I've seen him taking parts from one piano and working on them until they fit on another. I've seen him studying manuals until late night, manuals in a language he still has problems to master. He was grateful, he said, to have been able to purchase a set of up-time tools. They are so much better to work with than his old ones, and in some cases absolutely necessary.

Surprisingly, Johannes was the first to produce a profit, and with the simplest idea.

Up-time cellos have a pin at the bottom of the instrument that permits the players to keep them upright without holding them tight between their knees. This simple innovation saves a sensible amount of the musician's energy and permits him to focus his attention completely on his performance, improving it drastically. Johannes sold the whole idea to the guild in Fussen, and, at basically no costs, was able to earn the first hard money for the company. I would not be surprised if they will start making cellos with the long pin very soon.

Ten days ago, when I was about to come home after a long day of musical studies, I heard Girolamo calling me from the garage. I hurried up, and, as soon as I entered the room, he invited me to sit in front of one of the uprights; the one that was in the best shape when acquired. I could hear the excitement that was barely contained in Girolamo's voice.

Even if the frame didn't have the rich ornaments and paintings that are Girolamo's signature; I could proudly read "Pianoforti Zenti" beautifully carved on a small silver plate just above the keyboard.

"So you fixed it," I said, in Italian.

"*Si*, I think it's done. Tuning it was a pain in the ass, and I would never have done it without the kind assistance of Hermann Katzberg, but I really think you should try it. It is my special present to the man who will change the musical world. This way some of your future glory will ooze back to me."

I stood still for a while, speechless and sincerely moved by such a present. Then my hands almost moved by themselves and started playing a composition I had written for organ a few years before and I just recently transcribed and enriched for piano with Mrs. Jordan's help.

While the notes where flowing from my hands to the wooden keys I felt something grandiose growing in me. All my fears and doubts of the months before were vanishing from my soul and a sense of strength and determination were digging their way into the deepest part of my heart.

I think that was the first time I played the piano without committing any mistakes.

In all this turmoil of events I had completely forgotten about my patron, Stefano Landi. Well, he didn't forget me because he recently sent me an irate letter asking me if I had found something about him and his works. It's not very Christian of me, but I can say with a certain satisfaction that I haven't found much. In the universe where the Americans came from Maestro Landi was probably too busy fighting with his sickness or enjoying his glory to compose anything worth being archived here in Grantville.

For a few days I wasn't sure if I should have written him the truth, but then I've had another moment of luck that gave me the idea for a small ruse. Apparently, just before the Ring of Fire, in a part of the USA called Michigan, there had been a revival of French Baroque Opera. The artists of this century will be known as *barocchi* by our posterity, even if I would much rather be called contemporary or *stil novista*. After all, as my American friends would say, I am a plain guy and I

hardly believe someone may consider me bizarre. Too bad we cannot control the opinion history will have of us.

Anyway, the music and the libretto of an opera named *Les fetes de l'ete* written by a composer called Monteclair made it here to Grantville before the Ring of Fire, somehow. I bought them, together with other music sheets. I plan to have it copied it and to send it to Rome.

Even if the style is different from Landi's, I can always explain that this opera was considered to be a revolutionary piece, a true advancement in composition and style. Considering the vastness of Landi's ego, that should soothe any of his doubts. Besides, I suspect the Barberini will appreciate having an opera in French played in their theater and Landi loves whatever makes the Barberini happy.

I know it's not very honest of me and, I confess, it gnaws at my conscience. I can only hope that this Monteclair, somewhere in another universe's heaven, would be glad to know that his opera will be staged again.

In the last days people here have been very nervous. We see more movements of troops and everybody is waiting for a move from one of the many forces that are putting Gustavus Adolphus' lands under siege. Just yesterday, Girolamo was almost caught in a brawl at the Gardens with some of the Scottish soldiers stationed here. I am glad he managed to remain calm and simply walk out unscathed. He is saying he wants to go to Magdeburg to scout the place. I hope he does it soon; being on the road again should calm him down.

I am worried, Father. Today there is something in the air that doesn't smell good. A few minutes ago, the town became silent. There is no trace of the strong background noise that fills our lives night and day. I need to interrupt my writing and ask what is happening. Is it another raid on the town?

* * *

I am just back with the direst of news. What everyone dreaded has just happened. The League of Ostend has attacked Wismar and war is upon us. It seems that the attack has been repelled, but some young soldiers, loved by the people of this town, have been killed.

Pray for me, for us, Father, because we need it more than ever. I look forward to receiving another of your letters should they make it here.

Your humble servant and student

Giacomo Carissimi

FACT ARTICLES

In Vitro Veritas: Glassmaking After The Ring Of Fire

By Iver P. Cooper

In the early seventeenth century, there was already a vigorous international trade in glassware. The world center for glassmaking was in Venice, and the Venetians were most famous for tableware and glass mirrors made of the colorless *cristallo*. Germany and Bohemia were known for large, decorated drinking glasses, especially those of the green shade which came to be known as *waldglas*. The French craftsmen of Lorraine and Normandy made both clear and stained glass for windows, some of which was exported.

What, then, do the up-timers of Grantville have to offer experienced Renaissance glass workers? New types of glass (notably borosilicate and lead-alkali glass) will make possible much improved laboratory glassware and optical instruments. New manufacturing methods will allow the production of glass products at a greater rate and at a lower price than what the down-timers would have thought possible. And there are some new glass products for them to consider.

Up-Time Knowledge of Glassmaking

It is fortunate that the up-timers will be attempting merely to inject new ideas into an already vigorous and innovative down-time industry, not recreating glass technology from scratch. Most of the Grantville library books that are specifically about glass are really about collecting antique glass, appreciating art glass, and so forth, rather than about glass technology. It may be interesting to see how the Venetians react to photographs of the creations of Tiffany, Lalique and Chihuly, but art glass books are not going make it easier to operate a chemical laboratory or manufacture modern optics.

Fortunately, at least four different encyclopedias were transported to 1632 by the Ring of

Fire. The public library has the *Encyclopedia Americana*, and both the modern and the 1911 editions of the *Encyclopedia Britannica*. The high school has the *World Book Encyclopedia*, and the junior high, the *Collier's*. Collectively, they provide sample glass compositions and at least outlines of several important manufacturing processes.

There may be more information available from Grantville residents. Edith Wild (1949-16??) was employed in a glass factory before the Ring of Fire ("The Wallenstein Gambit" *Ring of Fire*), and several retired glassworkers are listed in the "Up-timers Grid."

Types of Glass

About 95% of modern glass production is of "silicate system" glass, in which the glass-forming material is silicon dioxide (silica). The properties of a silicate glass can be altered by adding to it a variety of substances. Fluxes reduce the temperature at which the glass softens, making it easier to work. Stabilizers improve the chemical and mechanical properties of the finished glass. Colorants and decolorants change its optical properties.

Two types of modern glass are already familiar to down-timers. About 90% of modern silicate glass production is of soda lime glass, which is used in bottles, windows, light bulbs, and tableware. The silica is combined with sodium oxide flux and calcium oxide stabilizer. Usually, the silica is from sand (or quartz pebbles), the sodium oxide is formed from sodium carbonate (soda ash), and the calcium oxide is derived from calcium carbonate (limestone). There are also potash lime glasses ("Bohemian glass"), which feature potash (potassium oxide) instead of soda. These glasses were used, prior to 1632, to make stained glass windows.

So far as major *new* glasses are concerned, the major up-time contributions will be lead-alkali and borosilicate glasses.

Lead-alkali (flint) glass was supposedly "invented" in 1676 by George Ravenscroft (1632-1681), a glass merchant. The "new" glass, besides being more sparkling (because of its higher refractive index than soda lime glass), was also softer and therefore easier to cut. Within twenty years, over one hundred English glass houses were producing lead glass.

Lead-alkali glasses are used in our time line for prisms and lenses, for the more demanding electrical insulation applications, and in higher-end tableware. They contain silica, lead oxide, and at least one alkali (sodium or potassium) oxide. *Collier's* offers two recipes for lead-alkali glass; the simpler one, for optical use, being 44.6% silica, 0.5% sodium oxide, 8% potassium oxide, and 46.9% lead oxide. The one for electrical use has only 21% lead oxide. In the *Encyclopedia Britannica* formulation, the lead oxide content is 25%.

Ravenscroft actually rediscovered an ancient invention; there are both Roman and Islamic glasses which are as much as 35% lead oxide (Lambert, 118). Given this history, and the availability of suitable lead ores, I am not expecting that the USE will have great difficulty in duplicating lead-alkali glass. And this, in turn, will give it the ability to produce attractive cut crystal (earning some coin on the export markets) and, more importantly, high quality optical equipment.

Where can we find lead oxide? As it turns out, lead oxide has, for thousands of years, been a byproduct of the "cupellation process" of producing silver. There is a small amount of silver in galena, the principal lead ore. The main component of galena is lead sulfide, and it is readily oxidized, when roasted in a wood fire, to form lead oxide. The lead oxide ("litharge") can then be

separated out by absorbing it with bone ash.

Encyclopedia Americana lists Germany as a leading lead-mining country, although well behind the United States and Australia. It also says that there are major deposits of galena in Germany. Down-time miners should be well aware of it, as it has a very distinctive appearance.

* * *

Borosilicate glass contains, as you might expect, silica and boron oxide. It is used primarily in chemical glassware and in ovenware.

Modern borosilicate glass was developed in 1912. Curiously, by 1225, the *Chinese* were already aware of the use of borax in *Arab* glassmaking. Zhao Rukuo noted that "borax is added so that the glass endures the most severe thermal extremes and will not crack" (Smith).

Seventeenth-century European glassworkers were extremely secretive about their craft. It is conceivable that prior to 1632, there was some European use of borax in glassmaking. However, the first definite reference dates back only to 1679, when Johann Kunckel (1630-1703) mentioned borax in a recipe for an artificial gem (Smith).

The *Encyclopedia Britannica* gives us a starting point for formulating these glasses: for chemical glassware, use 81% silica, 12% boron oxide, 4.5% (sic) sodium oxide, and 2% aluminum oxide. The same table also gives a formula for an optical borosilicate glass, "crown" glass: 68.9% silica, 10.1% boron oxide, 8.8% sodium oxide, 8.4% potassium oxide, 2.8% barium oxide, and 1.0% zinc oxide. Two more borosilicate glass formulas can be gleaned from *Collier's*; these leave out the barium and zinc oxide, but do contain a little aluminum oxide. And a fifth recipe appears in the *World Book Encyclopedia*. So take your pick. Collectively, the indicated range in boron oxide content is roughly 10 to 25%.

Boron oxide is readily obtained from borax (hydrated sodium borate), other borate salts, or boric acid. In 1632, borax was imported to Europe from Tibet under the name of "tincal." We shouldn't have any difficult getting our hands on tincal from our Venetian trading partners. The real question is price. Borax from Tibet was a luxury item in Renaissance Europe, used primarily by goldsmiths and assayers. If we want to make more than just small quantities of borosilicate laboratory glassware, we will want to exploit nearer sources. Fortunately, the encyclopedias provide some clues.

Boric acid can be obtained from the lagoons in the "Maremma" of Tuscany (this source was not known in our time line until 1777). The 1911 EB entry for "boric acid" describes in some detail how the boric acid is recovered.

The encyclopedias also reveal that "pandermite," a hydrous calcium borate, can be obtained from Panderma (Panormus) on the Sea of Marmora: "it occurs as large nodules, up to a ton in weight, beneath a thick bed of gypsum." Panderma (Panormus) also is said to have a trade in "boracite."

Boracite, a mineral containing magnesium borate, can even be found in Germany. "Small crystals bounded on all sides by sharply defined faces are found in considerable numbers embedded in gypsum and anhydrite in the salt deposits at Lüneburg in Hanover, where it was first observed in 1787. . . . [A] massive variety, known as stassfurtite, occurs as nodules in the salt deposits at Stassfurt in Prussia." (1911 EB, "boracite"). One of my field guides to minerals actually has a photograph of a boracite crystal found in Bernburg, in Thuringia, Germany. (Hochleitner, 206).

Down-time glassworkers will need to adapt to the special properties of borosilicate glass. It

has a softening point of 820 deg. C and a working point of 1,245 deg. C. In contrast, the values for the familiar soda lime glasses are typically about 750 and 1,000, respectively. (Just to complete the picture, the values for lead-alkali glass are 677 and 985, respectively. All these numbers are in the *Encyclopedia Britannica*.)

* * *

There are four other major types of modern glass: aluminosilicate; fused quartz; fused silica; and 96% silica. These glasses are all more resistant to high temperature, heat shock, and corrosive agents than borosilicate glass, but also more difficult to make and work. The other USE industries have not yet advanced to the point where they are needed.

* * *

Down-time glass makers already have many colorants and decolorants. However, they don't yet know how to make the famous ruby glass of Bohemia, because its inventor, Johann Kunckel (1630-1703), is still in diapers. The secret to reproducing this glass is the use of microscopic particles of gold chloride.

Manufacturing Methods: Overview

Glass is *cast* by pouring it, while liquid, into a mold. Because of its viscosity, glass does not fill a complicated mold shape without assistance. A gob of molten glass can be forced, by means of a plunger, to spread throughout the cavity. This is called *pressing*.

Glass may also be *blown*. A bubble of molten glass is placed inside a mold and more air is forced into it, causing it to expand into contact with the mold.

In *drawing*, a tool called a *bait* is lowered into the molten glass and then raised. The glass adheres to the bait, and depending on the shape of the bait, a thread, rod or sheet of glass is drawn up. Glass may also be *extruded* through holes, as a result of centrifugal force, or a blast of air.

Molten glass can also be squeezed between rollers to produce a flat glass. *Rolled* glass may subsequently be *floated* on a bath of molten metal, so it smooths out.

* * *

Almost all of the processes mentioned above were initially carried out by hand, and later by machine. As a nation of "master mechanics," Grantville will certainly attempt to find ways of automating the seventeenth-century glasshouse. However, it would be a grave mistake for them to attempt to duplicate, with machinery, a process which they have not carried out manually. All sorts of little things go wrong when you try to automate a complex process, and, if you don't have a deep understanding of the handicraft, then you aren't sure whether the problem is with the machinery, the raw materials, or whatever.

Once you have an understanding of the subtleties of hand blowing, casting, drawing, pressing, rolling, grinding and polishing glass, you are ready to consider whether any of the steps can be automated. The *World Book Encyclopedia* sketches out methods of blowing glass bottles, pressing glass dishes, and drawing glass tubing (the Danner process). The 1911 *Encyclopedia Britannica* describes mechanical methods of pressing, blowing and drawing glass. It even discusses the famous 1904 Owens "suck-and-blow" bottling machine. The modern *Encyclopedia Britannia* divulges two more methods of making glass tubing (the downdraw and Vello processes), the workings of the 1926 "ribbon machine" (which makes 30 light bulb shells per second), and the basics of blow-and-blow bottle making on the "Individual Section" machine.

Both modern reference works describe the jewel of the modern glass industry crown, the Pilkington float process (discussed in a later section) for making plate glass without polishing steps.

In general, the encyclopedias describe the basic operations that the modern machinery performs, but not the specific mechanisms which accomplish them. For example, the *World Book Encyclopedia* (WBE) describes a mechanical method of blowing glass bottles: drop a gob of glass into a bottle-shaped mold (neck end down); blow air in to force the glass into the neck; flip the mold; and then blow air in again to force the glass down to form the walls of the main compartment (WBE 214). But the neophyte mechanical engineers of Grantville will need to figure out the exact gadgetry that will ladle out or suck up that gob, manipulate the mold, and blow on command. They will also need to design the appropriate conveyors, guides, controls, safety rails, etc.

The same reference also explains the 1917 Danner process for mechanically drawing tubing: let a ribbon of glass entwine itself around a slowly rotating mandrel, and then pull it off. The mandrel itself is hollow, and air is blown through it so the walls don't collapse upon the hollow center. The tubing is fed by rollers to a cutting device (WBE 214). Someone still needs to figure out how the operating temperature, the rate at which the glass is supplied, the material of which the mandrel should be made, the rate of rotation and angle of inclination of the mandrel, and the rate of air flow through it.

Improved Manufacturing Methods: Plate Glass

To make good windows, you need to be able to make plate glass. Plate glass is not merely any old flat glass. It is glass which is clear, and has flat, parallel surfaces. Otherwise, it will afford only a distorted view. Some techniques produce plate glass directly, others produce a rough-surfaced sheets which must be ground and polished to convert them into plate glass.

There were two down-time methods of making of large panes of glass. In the Crown glass ("Normandy") method, a bubble of glass was blown, cut open, and spun about. The spinning resulted in a circular pane. The glass was frequently reheated during this process, giving it a high polish (fire polish). The glass was cooled, and the workers first cut out the center (bulls' eye), and then cut out straight pieces.

In the Broadsheet ("Lorrainer") method, the glass was blown, then swung to form a long cylinder, a "sausage." The craftsmen cut off the ends, opened the cylinder lengthwise ("muffing"), placed it in a flattening oven, and polished it (Gros-Galliner, 32-33).

* * *

The first logical improvement would be the introduction, half a century earlier than in our time line, of the French method of making plate glass by grinding and polishing "table cast" glass. In 1687, Bernard Perrot "invented a method, hitherto unknown, of casting glass into panels, the way one does with metal . . ." He poured molten glass onto an iron plate covered with sand, and then rolled the glass flat. After it cooled, it was ground and polished with iron disks, abrasive sands, and felt disks. The Perrot method, as practiced in the great French manufactory of Saint Gobain, allowed production of plate glass (and flat glass mirrors) on a theretofore unheard-of scale. Saint Gobain produced the 306 mirror panes of Versailles' Hall of Mirrors, which effectively served as a permanent advertising kiosk for the French plate glass industry.

In 1903, John H. Lubbers partially automated the medieval Lorrainer method. A circular bait, at the end of a blowpipe, was dipped into a draw pot, and a cylinder of glass was drawn up. The

cylinder still had to be manually cut and flattened. Nonetheless, the Lubbers technique allowed the fabrication of larger sheets of glass by less skilled workers. This method is mentioned in the 1911 EB, although that reference mysteriously remarks that during the drawing operation, the cylinder is "kept in shape by means of special devices."

By 1905, Emile Fourcault succeeded in vertically drawing a continuous sheet of glass directly from the glass furnace. The Fourcault process is also described in the 1911 EB. However, it naturally does not reveal the improved process (featuring a device called a debiteuse) which Fourcault developed in 1913, so the glass did not narrow at the base as the leading edge was drawn up (Douglas, 155). The drawn glass was still marred by rollers, and needed to be ground and polished to be suitable for optical use.

* * *

What truly revolutionized the plate glass industry was Alastair Pilkington's float glass process (1952), in which the glass spreads out over a layer of molten tin. Because the surface of the molten tin is flat, the glass also becomes flat, settling to a thickness of six millimeters.

The *Encyclopedia Britannica* favors us with a schematic diagram of the Pilkington float process, and with a few process parameters. It is certainly worth trying to duplicate once we have mastered the earlier plate glass production methods. However, it is important to recognize that it took seven years, and seven million pounds, to reduce the idea to practice, using 1950s' technology. We do have the advantage of having a description of the perfected process, but there is no doubt in my mind that the explanation leaves out important details. For example, the operator needs to control the viscosity gradient by appropriate settings of the water coolers along the process line. And some of the details it does give, such as the need for a controlled hydrogen-nitrogen atmosphere to prevent oxidation of the tin, are daunting.

New Manufacturing Methods: Mirror

The down-time state of the mirror-making art was the technique developed by Venetians Andrea and Domenico de'Anzolo del Gallo in 1507. They realized that the Venetian *cristallo* could be given a highly reflective surface by hammering tin into thin sheets, amalgamating it with mercury, and then laying the sheets of *cristallo* onto the amalgam.

We can greatly improve upon this century-old technique, dispensing with the poisonous mercury, and also obtaining a more uniform coating of controllable thickness. In 1835, Justus von Liebig discovered that silver could be deposited in a thin film on glass. There are many variations on the Liebig process, but in all of them, a solution of a silver salt is used as a source of silver ions. A reducing agent reduces the silver ions to neutral silver atoms, and the latter are deposited on the glass. In Liebig's original work, an ammoniacal solution of silver nitrate was heated with and reduced by an aldehyde (e.g., formaldehyde) to elemental silver. The process was commercialized in the 1840s, and true silvering replaced foiling.

Two related methods of reduction by solution have been developed. In the "hot" silvering method, the ammoniacal silver nitrate solution was boiled, and the condensing steam was reduced with tartaric acid (more precisely, with Rochelle salt, the sodium-potassium salt of tartaric acid.) This deposit method is slow; it may take an hour to form a thick film. For this reason, the "hot" or "Rochelle Salt" process is favored for making "one-way" mirrors, which have a partially reflective surface (Newman, 317, 322). In the "cold" method, the reducing agent is sugar (Gregory, 158). This is also called the Brashear process.

An improvement on the basic method is to sensitize the glass so it more readily accepts the metal. This is usually done by "tinning"; treating the glass with a dilute stannous chloride solution (Newman, 15, 314).

Originally, silvering solutions were poured onto the glass. However, they can be sprayed on, instead. Typically, two jets are used, one supplying the ammoniacal silver nitrate and the other a fast-acting reducing agent such as hydroxylamine sulfate (Schiffer, p. 7).

There are alternatives to silvering, such as aluminizing, but I don't expect them to be duplicated within the near term in the 1632 universe.

Miscellaneous Up-Time Manufacturing Innovations

Optical glass must be homogeneous. Curiously, the importance of stirring the melt, so that the ingredients were efficiently mixed, was not recognized until 1790, when Pierre-Louise Guinand pioneered the use of a refractory ceramic stirring rod. (WBE, 218). This is one of those ideas which was long in coming, but was readily implemented.

It is also important to inhibit the formation of bubbles. This can be done by the addition of a fining (degassing) agent. Several are mentioned by the *Encyclopedia Britannica* (EB): arsenic oxide, sodium nitrate, sodium chloride, sodium sulfate and sodium nitrate (EB 300).

Early glass furnaces used wood as fuel. England needed the wood for shipbuilding, and, once the English figured out how to make a coal-fired furnace, they banned further use of timber (1610-1615). The new furnaces could achieve higher temperatures, which allowed for use of higher-melting glass compositions.

There is plenty of coal in the USE, but up-timers may find it advantageous to burn natural gas instead. It is readily available in the Grantville area, it is a more intense energy source, and it facilitates manufacturing. For automated feeding, the glass must have the correct viscosity, which in turn depends on temperature. It is easier to control the temperature of a gas-fired furnace. (Douglas, 42).

Important energy savings result from the use of a regenerator. Essentially, the flue (waste) gases are used to heat a brick "checker work" (shown in Fig. 4 of the *Encyclopedia Britannica* "Industrial Glass" article, and also discussed by the 1911 EB), which in turn is used to preheat the combustion gases. Heat regeneration was first used in the 1860s and reduced fuel consumption by about 90%.

* * *

A major continuing expense for a pretwentieth-century glass factory was the pot used to hold the molten glass. In early nineteenth-century America, this pot cost about one hundred dollars, and took eight months to build from clay. It was able to resist the tremendous heat, but its life span was only eight weeks, and so the pots had to be replaced over and over again (Polak). Modern glass furnaces use highly refractory ceramics. (Different glass melts may necessitate different ceramics.) The *Encyclopedia Britannica* has two helpful comments on this point. First of all, it teaches that "clays of a high alumina-to-silica ratio, with minimal impurities," are more resistant. Secondly, it singles out the "electric-arc fusion-cast" ZAC refractory (35% zirconia, 53% alumina, 12% silica), developed in 1942.

Alumina is aluminum oxide. One major alumina ore, bauxite, is available in France and in Ireland. Please note that we aren't proposing to extract aluminum, but rather to use the bauxite, a

claylike mineral, directly. A possible alternative to bauxite is kaolinite (aluminum silicate). According to the 1911 EB article on "kaolin," there is kaolinite "near Schneeberg in Saxony."

* * *

Modern glassmaking operations employ a tank furnace. The raw materials are fed in at the loading end and the molten glass is removed from the working end. These tanks can be operated continuously, while pots process glass one batch at a time, which is less efficient. The first continuous furnace was constructed by Friedrich Siemens in 1867.

* * *

While the Grantville Library provides critical information concerning both lead-alkali and borosilicate glass, the fact remains that quality control is going to be an ongoing problem. The mineral content of sands, ashes, and so forth are going to vary from source to source and even from lot to lot.

In the short term, USE glassmakers will keep careful records as to which raw materials were mixed together, in what proportions, to obtain a particular batch of glass, and the physical and chemical properties evidenced by that glass. If a particular batch does not pass muster for its intended purpose, it can be used for some less demanding task, or remelted. (A significant portion of the input to modern glass furnaces is rejected glass, called "cullet.")

The high school chemistry laboratory also should be capable of performing qualitative tests for some metals, using the standard flame and bead tests. I would expect the high school science teacher, Greg Ferrara, to know about these assays.

Grantville glass companies can make glass production more predictable by purifying the silica and the glass modifiers, so that the glassmakers know just how much of each ingredient they are adding to the melt.

Also, as the USE develops capabilities for production-scale inorganic chemical synthesis, it will be able to use alternative starting materials which are cheaper or more readily available. By way of precedent, the late eighteenth-century French government wanted to eliminate its dependence on Spain as a source of soda. (A Spanish seaweed, when burnt, provided an ash that was 20% soda.) The French offered a 2,400 livre prize, which was won by LeBlanc in 1787. LeBlanc synthesized a purified soda (sodium carbonate) from sea salt (mostly sodium chloride).

Improved Glass Products: Laboratory Glassware

Laura Runkle has pointed out that "in order to make pharmaceuticals, the people of Grantville need stainless steel, or glass-lined vessels." ("Mente et Malleo: Practical Mineralogy and Minerals Exploration in 1632," *Grantville Gazette* Vol. 2).

In *1632*, Greg Ferrara commented, "Sulfuric acid is about as basic for modern industry as steel" (Chap. 40). Where, exactly, do you put sulfuric acid? Clearly, you need a corrosion-resistant vessel, whether that be glass, lead, or steel. If you want to play with hydrochloric acid, you need glass, a molybdenum-rich alloy, or tantalum.

For laboratory scale chemistry, glass is clearly superior to stainless steel and various exotic metals. Not only is it corrosion-resistant, it can be made transparent, so you can observe the chemical processes as they take place. Or it can be amber-tinted, to protect photosensitive chemicals. Glass is used extensively in the bottles, graduated cylinders, beakers, flasks, pipettes, condensers, test tubes, watch glasses, burets, funnels, crucibles, and retorts of modern chemical

laboratories.

Borosilicate glass, such as that sold under the trademark Pyrex, is preferred, because it is especially resistant to acids, high temperatures, and sudden changes in temperature (thermal shock).

Improved Glass Products: Optical Instruments

Another form of specialty glass is optical glass. Dutch Admiral Maarten Tromp, awaiting the approach of the Spanish fleet, enviously remembers his brief experience with up-time optics: "The stunning visual clarity, featherlight weight, and exquisite craftsmanship of the binoculars had been convincing evidence of the marvels of which American artisans were capable." (*1633*, Chap. 19). King Gustav II Adolf of Sweden was equally impressed with Julie MacKay's spotting scope (*1632*, Chap. 48). And the nearsighted cavalryman Andrew Lennox appreciated his new American-made spectacles (*1632*, Chap. 16).

Like window glass, optical glass must be transparent. However, the real power of optical glass is realized when the glassware has a curved surface, creating a diverging or converging lens. Optical glass makes possible not only better spectacles and telescopes, but also microscopes. The latter is extremely important if medicine is to advance.

The preferred optical glass is a lead-alkali glass, which has a higher refractive index (a measure of the ability of the glass to alter the path of light which strikes its surface obliquely) than soda-lime glass.

Incandescent Light Bulbs and Fluorescent Light Tubes

Letting light escape, while keeping air from entering, is the function of the glass bulb of an incandescent light. The down-time master glassblower Hensin Hirsch is making light bulbs by hand, evacuating them using a vacuum pump scavenged from a refrigerator. (Gorg Huff, "Other People's Money," *Grantville Gazette*, Vol. 3). If the up-timers can duplicate the ribbon machines of our time line, then they can mass-produce light bulb shells.

In a fluorescent tube, the glass enclosure confines the mercury vapor. Electricity causes the latter to emit ultraviolet light, and this in turn stimulates a phosphor coating on the glass to absorb the light energy and re-radiate it as visible light.

Down-time glassblowers can certainly duplicate the tube itself, and mercury was available in 1632. The issues are how to inject the mercury safely, and how to obtain and apply the phosphor. I don't consider fluorescent lamps to be a practical development target for the USE, at least in the short-term.

Greenhouses

A logical extension of the normal architectural use of the window is the greenhouse, which has glass walls and ceiling. Greenhouses would allow the USE to grow plants that can only thrive under tropical conditions, or to obtain additional crops of plants that die back or become dormant in the northern European winter. Soon after the Ring of Fire, "medicinal and ornamental plants

were [being] grown in the glass-roofed conservatory" of Grantville's hospital (Ewing, "An Invisible War," *Grantville Gazette*, Vol 2). If USE explorers venture into Latin America, they can bring back seeds of the *Hevea brasiliensis* rubber tree for greenhouse cultivation, and ultimate transplantation to a tropical country friendly to USE.

The concept of the greenhouse is not entirely foreign to seventeenth-century Europeans. De Serre protected individual plants by covering them with glass "bells" in 1600. There are also reports that orangeries with glass windows were established in Pisa (1591) and Leiden (1600) (Muijzenberg, 45). The greenhouse is quite practical if we can produce the necessary plate glass; "seconds" from the window glass factories would be probably be good enough.

Protective Glasses

Glass can be used in the windows of military vehicles and structures, but then we need to worry about the effect of enemy fire. A relatively low-tech way of reinforcing the glass is to use wire glass, which is sheet glass buttressed with a wire netting. Wire glass is made by lowering a wire mesh into a stream of molten glass. (Or by laying down a ribbon of glass, then the wire mesh, then another ribbon, and finally rolling them together.) Wire glass won't keep out a cannonball, but it will give some protection against, say, flying debris.

We should also be able to learn how to make tempered glass. The glass is heated to a high temperature and then cooled rapidly. The process increases the strength of the glass several fold, and also alters how it breaks; it powders, rather than forming dangerous shards. The duplication of tempered glass is a matter of determining, whether by library research or experiment, the necessary parameters, such as tempering temperature and cooling rate.

Both auto windshield "safety glass" and "bulletproof" glass are actually laminates of glass and plastic, and therefore must await the creation of a plastics industry.

Fiberglass

One of the largest twentieth-century markets for glass is in the manufacture of fiberglass. Coarse glass fibers were made and used in pre-Roman times, but merely for decoration of tableware. In 1870, John Player developed a process for mass producing a glass wool, useable as insulation. A fire-retardant cloth, with interwoven silk and glass fibers, was announced by Herman Hammesfahr in 1880.

Grantville's *Encyclopedia Britannica* briefly describes a method of making fiberglass in which the liquid glass enters a spinning, perforated cup, the fibers are extruded through the holes, and blasts of air fragment the fibers. Another approach, set forth in the *World Book Encyclopedia*, is to melt glass marbles in a furnace with a perforated bottom, and collect the threads onto a spinning drum. The tension created by the pulling drum helps draw out fine glass fibers.

The USE should be able make simple glass wools and cloths, but fiberglass composites, such as those used in the hull of the speedboat *Outlaw*, require a mature plastics industry.

Military Mirrors

There are some military uses of mirrors which were not well established in 1632, but which could now be exploited by the USE. These include the following:

Periscopes

The trench periscope, used extensively in World War I, was invented by the Polish astronomer Johannes Hevelius (1611-1687) in 1637. The first naval use of the periscope was in the American Civil War, where one was improvised by Chief Engineer Thomas Doughty of the Union ironclad *USS Osage* during the Red River campaign of April 1864. (A periscope would have come in handy during the *Monitor-Merrimac* engagement, as Captain Worden of the *Monitor* was blinded when a shell struck near the viewing slit of the pilot house.)

Heliographs

In essence, the heliograph communicates coded messages in the form of light flashes. The principal advantage of the heliograph over the electrical telegraph has been that it could be used even in hostile territory, where a telegraph wire had not yet been laid, or was likely to be cut. This is not a problem with radio communications, but the number of radio sets in the USE is limited. The heliograph was used to great advantage by the British in Afghanistan and in the Boer War, and by the Americans in the Indian Wars.

The Indian tribes had countered the electrical telegraph by cutting telegraph wires and poles; the mirror telegraph was much less vulnerable to enemy action. The Apaches understood the significance of the heliographs all too well; they avoided the territory crisscrossed by the heliograph network. (Rolak).

The signalers were typically 25-30 miles apart, and could send messages over distances of 800 miles in less than four hours. (Wrixon, 435). The average speed of the system was reportedly 16 words per minute. (Holzmann). In 1894, the U.S. Army set a new heliograph distance record (183 miles).

The 1865 Mance heliograph had a tripod-mounted mirror linked to a key mechanism. The key tilted the mirror in and out of position, causing it to flash on and off. (Plum, 30). In a late nineteenth-century U.S. army design, light flashes were achieved by coupling the key to a shutter placed in front of the mirror. Some versions of the Mance heliograph had two mirrors. Just one mirror was used if the sun were in front of the sender. If the sun were behind the sender, the second mirror could be positioned to reflect the sunlight onto the one facing the recipient. (Wrixon, 433).

Rangefinders

A simple rangefinder uses two mirrors. One mirror, at one end of the baseline, is fixed at a 45 degree angle to the baseline. This stationary mirror is silvered on the bottom half but clear on the top half. The other mirror, at the other end, is a normal mirror, and is mounted so it can rotate. Look through the clear half of the fixed mirror at the target, then turn the rotating mirror until the object is visible in the mirrored half of the fixed mirror, too. A curved scale is used to trigonometrically convert the angular position of the rotating mirror into a distance to the target. The accuracy of the distance measurement is dependent on the length of the baseline; the longer

it is, the better.

The first use of the rangefinder was in the military. According to W.L. Ruffell, "No serious attempts to obtain ranges by instrumental methods were made before 1770. That year saw the short base method put to limited use, e.g. for siege purposes, but it was a time-consuming process. Development of efficient optical rangefinders did not commence until 1860, at the start of the rifled era, and culminated in the introduction of the well-known Barr & Stroud types 20 years later."

Industrial Mirrors

By 1632, concave mirrors had been used to melt metals and to heat liquids (Butti, 33-34). Solar energy, concentrated by concave mirrors (or by biconvex lenses made of good optical glass), can be used to power solar stills, solar water heaters, solar cookers, solar pumps, and solar furnaces. (Butti; EA "Solar Energy"). This may not be very attractive in northern Europe, but some of the USE commercial ventures will be in tropical regions where sunlight is intense. Solar energy is particularly attractive in arid regions where there is no inexpensive alternative fuel.

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Dyes And Mordants

By Lisa Satterlund

I. Introduction and brief history of dyeing.

By 1630, human beings had been using plants, animals and minerals to change the natural color of plant and animal fibers for at least five thousand years. The oldest written record of dye use goes back to 2,600 BC in China, and archaeologists have identified dyed textiles from about 1,400 years earlier than that. Vastly more is known about commercial dyeing than is known about early modern home dyeing. That doesn't mean that a lot is known about either. Dyeing was considered as much an art as painting, and rarely was the process documented before the latter part of the eighteenth century. Major sources of information about dyeing prior to that date are two dyers manuals that were published in the fifteenth and sixteenth centuries, manuscripts containing dye recipes other than the dyers manuals and economic records of towns and guilds. Next to nothing is known concerning home-dyeing prior to the revival of natural dyeing in the 1960s.

The first European commercial dyer's guide, *Mariegola Dell'Arte de Tentori*, was published in the early fifteenth century. Earlier works mentioned dyestuffs, the dye industry, and an occasional dye recipe. For example, a Greek manuscript known as the Stockholm Papyrus contains a recipe for imitation purple, and an Egyptian papyrus of 236 BC mentions dyers. Pliny the Elder talks about dye plants and bleaching with sulfur. For the most part, however, actual dye recipes were rarely printed. Dyers considered themselves artists, and guarded their recipes carefully. Years of development could go into the formulation of a good black dye, for instance, which would put that dyer's goods in great demand. Since reproducing colors with natural dyestuffs is never easy, the dyer could be fairly certain to maintain his position of superiority as long as the recipe did not become known.

The earliest colors that rated mention by ancient writers were reds, purples and blues; all dyed using natural materials that are known today and were major dyestuffs until the discovery of the first synthetic dye in 1856. Other subjects that ancient writers mention indicate that techniques such as printed fabric and batik are hundreds, if not thousands, of years old, as well.

Two major events in the history of dyeing during the early seventeenth century were the discovery of the effects of the use of tin as a mordant in 1630 by a Dutch chemist, and the

beginning of the East India Company's importation of calico from India in 1631. The discovery that the Indians were able to produce brilliant colors and fancy patterns on cotton resulted in a drive by European dyers to reproduce the effects.

II. Dyeing

A. Before the fact

Plant and animal fibers can be dyed in the fiber (raw), as yarn or as fabric. The process for preparing the fiber for dyeing varies only slightly for the different forms, but can vary quite a lot between fibers. Linen and silk were rarely dyed raw, due to the vagaries of processing these fibers. The natural color of most wool, stream-retted linen and silk is slightly yellow. Dew-retted linen is grayish. For the sake of simplicity, this article will refer throughout to fabric as the item being dyed. Also, please look to the glossary at the end for definitions of dyeing terms.

The first step in preparing the fabric for dyeing was scouring. For wool this meant washing in stale urine or a solution of potash and water to remove the natural oils still present, as well as any oils added during processing. Even where the wool had been scoured on the sheep or in the raw, dirt was inevitably picked up during the weaving and had to be removed before dyeing. The ammonia in the urine and potash mix acted as a detergent.

Silk had to be cleaned before weaving, as in its natural state it was coated with a waxy substance called sericine, which made the fiber sticky and gave it a harsh feel. The method was fairly simple: the silk was boiled in a soapy solution for a number of hours. The removal of the sericine took most of the yellow coloring with it. The same process was followed after weaving to remove whatever dirt and oils were acquired during processing.

Cotton and linen, which not only contained natural waxes but were often coated with sizing during weaving, were fermented by adding bran to warm water into which the fabric was packed. Weights held the fabric down during the fermentation process, and it was important to remove the fabric before the scum created during fermentation settled into the fibers.

Once the fabric was clean, it was time for bleaching. Cotton and linen were almost always bleached before dyeing as the bleaching process helped assure that the fiber or fabric would dye evenly. Wool and silk were generally only bleached if they were to be dyed a light color. "Black" wool, which could be any color from tan to dark brown, would be used in its natural state.

Silk and wool were bleached by means of sulfur fumes. The wet fabric would be hung in a special room with pots of sulfur set on the floor. The sulfur would be lit and the room sealed until the sulfur burned out. This process was much faster than the method used to bleach cotton and linen, but was considered less satisfactory because sulfur-bleached fabric tended to turn yellow if not carefully handled. In addition, this method of bleaching did more damage to the fibers. While it is unclear how old this method is, the Roman Pliny mentions the use of sulfur for bleaching.

Cotton, linen and hemp, all cellulose fibers, were bleached in basically the same way. The fabric would be soaked in a mildly alkaline solution (often made from "rotten urine" or potash dissolved in water), removed and rinsed, then spread out in the sun. Depending on the time of year, the fabric would be moistened by dew or by being sprinkled with water. After some time in the sun, the fabric would be rinsed again, soaked in a mildly acid solution (often sour milk), washed, then returned to another alkaline bath. This process of alkaline bath, sun exposure, acid neutralization and washing would be repeated eight or more times, depending on the degree of

whiteness desired. The entire bleaching process could take as long as eight months to complete.

B. Dyeing

Now the fabric was ready to be dyed. The first step was to obtain the dye. Commercial dyers bought theirs in the form of cakes, dried plants or wood chips. Home dyers, on the other hand, would have to gather the plants, lichens or other materials. This meant they needed to know which parts of which plants would produce the colors they were striving for.

Next, the dyer needed to prepare the dyebath, either by boiling and straining plant matter or by grinding prepared dyestuffs. Commercial dyers needed to know how many pounds of dyestuff were needed to dye large amounts of fabric, and trusted to experience (and the sellers of the dyes) for that information.

While the dyebath was being readied, the fabric was prepared for dyeing. Since it was received by the commercial dyer already scoured and bleached, the only step necessary was mordanting. A mordant is a chemical (most commonly a metal salt) that helps the dye adhere to the fabric. Fabric could be mordanted before, during or after dyeing. Since fabric was never dyed dry, it was common to use a mordant bath to wet the fabric before dyeing.

Once the dyebath was ready, the wet fabric would be lowered into it. The fabric would be drawn repeatedly through the dye to insure that the color would take up evenly. When either the desired color was achieved or the dyebath was exhausted, the cloth would be removed, rinsed thoroughly, and dried. Some colors required the fabric to be dyed multiple times.

III. Materials

A. Equipment and requirements (tools, fuel, location)

The two most important requirements for a dye house were plenty of clean, soft water and plenty of fuel. The location of the dye house was determined by this need for water and fuel. Dyeing required so much fuel, in fact, that many localities tried to limit the amount of wood bought by the dyers, restrict where it could be purchased, or ban the use of certain types of wood.

Ideally, a dyehouse had both a well with a pump and a system of pipes and troughs, and a nearby river. Soft water was preferred, as the minerals in hard water could affect the dye colors and the ability of the fabric to absorb the dye. The river was often used for washing fabrics (before or after dyeing) with the aid of a "dyer's raft" anchored in the river. There is record in the Hamburg archives concerning a hearing held to determine whether the dyers should be permitted to anchor a new raft after the old one was swept away during a flood. The council listened to testimony from local fishermen about the deleterious effect of the raft on the fish population. In the end, a new raft was permitted, but the dyers were forced to move it down steam, past the fishing grounds.

In addition to water and fuel, the dyers needed copper vats for preparing dyebaths, wooden vats for dyeing the fabric, furnaces for heating the water and boiling the dyes, hooks, rods, barrows and winches to move the fabric around, tools for grinding the dyestuffs, the dyestuffs themselves, mordants, and a building large enough to use and store it all. The building had to have a stone floor with provision for draining water and separate rooms for drying wet fabric and for storage. The roof had to be vented to allow steam and fumes to escape. Often, there would be a separate shed for storing fuel.

Setting up a dye house was an expensive proposition. In Nuremberg during the middle of the sixteenth century, the city council ordered a dyehouse built, with estimated construction costs of three thousand guilders. This was part of a series of expenditures made by the council to lure dyers from Antwerp to Nuremberg. All told, the council's investment totaled more than ten thousand guilders.

Home dyeing was simpler. All that was necessary was a pot for preparing the dyebath and some utensils for handling the hot, wet fabric. The modern home dyer uses inert pots and utensils dedicated to dyeing. The early modern home dyer probably used iron pots; whether these were dedicated to dyeing is unknown. The wet cloth could be lowered into the dyebath by hand, but once there a spoon or paddle would be needed to swish the cloth about and insure the color was absorbed evenly. Useful, but not required, would be some type of roller or wringer to squeeze excess dyebath from the cloth when it was done. Lastly, a place was needed to hang the finished product where it would be protected from dirt and dust while it dried.

B. Dyestuffs and mordants

i) Dyes:

Dyestuffs could be found everywhere, but since most produced various shades of yellow and brown, those that produced reds, purples and blues were more valuable. After the discovery of the Americas in the fifteenth century and the establishment of the English East India Company in 1600, more exotic colors were available. Explorers were so aware of dyestuffs as trade goods that the country Brazil was named after the abundance of brazilwood found there. Not all the exotic dyestuffs were worth using, however. The red produced by brazilwood, for example, is fugitive, as is the lavender that comes from logwood.

The most common sources for reds, purples and blues during the early modern period were madder (red), murex (so called "imperial purple"), kermes (red), orchil (purple), woad (blue) and indigo (blue).

During the period between 1624 and 1627 in Frankfurt am Main, the cost of various dyestuffs ranged from about seven guilders per hundredweight for madder to two hundred and twenty guilders per hundredweight for indigo from Dominique. Between those two extremes, prices are recorded for galls from Aleppo at twenty-four guilders per hundredweight, woad from Erfurt at sixty guilders per barrel (approximately sixty pounds) and cochineal from Poland at about nine guilders per pound. Thus, it is clear that the price of the various dyestuffs varied widely.

The most expensive colors were black, blue and dark green, all of which required bottoming with woad or indigo first. The highest quality blacks were produced by "bottoming" fabric with woad until it was a very dark blue, then overdyeing it with madder. This combination made a color very close to a true black. Blue used woad or indigo alone, and dark green was produced by overdyeing blue fabric with weld, dyer's greenweed or a similar yellow dye.

Cheaper methods did exist to produce dark colors. Galls mixed with iron filings made black, black walnut shells produced a good brown, yellow bedstraw and safflower (when prepared as a vat dye) produced red. The home dyer may have experimented with reds and purples from beets and berries, too. Unfortunately, time has shown that these last produce only fugitive colors. Some of the colors produced by these cheaper methods were as good as the more expensive dyestuffs. Some, however, were not. Dyes containing too much tannic acid or iron damaged the fabric, eventually causing the fabric to disintegrate. Safflower red, like the berry colors, was fugitive.

Dyes such as galls, sumac, vitriol were banned in many cities and called "devil's colors" because of the damage they did to the fabric. As a measure to protect the woad trade, indigo also appeared in most lists of "devil's colors," even though it did not damage the fabric and, in fact, was a more efficient dye than woad.

ii) Mordants:

In fact, most dyes were fugitive without the assistance of a mordant. Most mordants are metal salts, although there are a few, like tannic acid and tartartic acid, that are not. During the early modern period, the most common mordants were alum, copperas (iron) and blue vitriol (copper). All of the metal-salt mordants were toxic to some degree. Disposal of mordant baths and spent dye liquor into the nearest river led to fish kills and unnaturally colored streams.

A number of other chemicals were used in association with mordants, such as cream of tartar, urine, salt and vinegar. Some of these chemicals helped balance the pH of the dyebath while others helped assure the color was taken up evenly. The desired pH of the dyebath depended on the fiber being dyed, since silk and wool take color better in an acidic bath, while cotton and linen require an alkaline bath.

Fabric could be mordanted before, after or during dyeing. Most commercially dyed fabric was mordanted before dyeing, and then sometimes mordanted again, with a different salt, after dyeing. The combination of mordants and when they were applied both affected the final color. Many dye recipes from the Innsbruck manuscript, which contain the earliest known dye recipes in the German language, call for two or three different mordants to be applied.

Some dye plants also act as mordants, and would be easy for the home dyer to obtain. These include oak leaves, bark, galls and nuts, sumac or alder leaves, and black walnut shells. All of these alone produce brown and tan dyes. When combined with other colors, they would darken the original color. In addition, by using a copper or iron pot, the home dyer could simultaneously dye and mordant, thus saving a step in the process. Some modern dyers claim that dyeing in a reactive pot does not provide enough mordant to insure that the color will remain fast.

Club moss and seaweed, which contain alum, were also available to the home dyer, and where old wine barrels were accessible, the cream of tartar could be scraped from the inside of the barrels and added to the dyebath. Urine would also be a common mordant for the home dyer. It works better with some dyes than with others, and certain dyes, such as woad, require it. However, woad is not a mordant dye in the usual sense. It is a vat dye. The coloring agent is insoluble in water, and the dyebath is a solution of wood ash and rotten urine in which the woad has been fermented.

In addition to helping the dye bond with the fiber, mordants can change the color of the final product. Copperas (iron) and blue vitriol (copper) are said to "sadden" colors because they darken them and make them dull. Alum has very little effect on the color, which is one of the reasons it was so popular. Tin, which was first used as a mordant in 1630, brightens or "blooms" colors. Tannic acid tends to make colors brown. Other chemicals, while weak mordants by themselves, can be used to alter the effect of traditional mordants. Adding ammonia and probably urine causes yellow dyes to turn greenish. Vinegar both brightens and darkens colors.

The choice of mordant can make a dramatic difference in the final color obtained. Wool dyed with Dyer's greenweed and mordanted with alum produces a clear yellow, while wool mordanted with tin produces a dark blackish brown. Copper as a mordant with this plant and wool gives the yellow a greenish tinge.

Most mordants were sold by the hundredweight, with prices at Frankfurt am Main ranging from five guilders per hundredweight for Austrian red cream of tartar to thirty-three guilders per hundredweight for Aleppo galls. It is clear from the prices that quality varied with location. The price for Dutch alum ranged from seven to nine guilders per hundredweight, while the price for Bohemian alum was twice that.

Dyes and mordants were generally used at near boiling temperatures, filling the dyehouse with steam and fumes. Some of the materials in use, such as urine and fermenting plant matter, stank even at low temperatures. The addition of heat caused some volatiles to boil off, increasing the smell. Between the smell and the damage to nearby streams, dyehouses were not popular neighbors.

iii) The fiber:

For the most part, dyestuffs produced the same colors no matter what fiber the fabric was made of. So woad and indigo turned cotton and linen, as well as wool, blue. Wool is the easiest fiber to dye, whether in the hands of the commercial or home dyer. It takes color well and is very reactive to the different mordants. Silk is also easy, and the colors, while perhaps not as deep as those in wool, are very vibrant. Both of these are protein fibers. Cotton and linen, on the other hand, are cellulose fibers, and until chemists and dyers unlocked the secrets of the Indian dyeing industry, cotton and linen tended to be paler and less vibrant. Fabric wasn't the only thing being dyed. Recipes exist for dyeing feathers, leather, wood and food.

IV. Applications

While keeping in mind that no up-timer has knowledge of early modern dyeing, there are still areas in which Grantville's collective knowledge of modern chemistry could lead to changes and improvements. The following are some suggestions.

Speeding up the bleaching of cotton and linen. The article on bleaching in the 1911 Encyclopedia Britannica can be used as a starting point. That article traces advances in fiber bleaching.

Improving the purity of mordants. Mordants which could be relied upon to act in specific ways would be in high demand by dyers.

Improving the purity of dyes from woad and indigo. Synthetic indigo took a long time to develop. In the meantime, a dye of known strength and reliability would be a source of income for the developer.

V. Glossary

A. Terminology

Adjective dyes: Dyes that require the presence of a mordant.

Bleaching: Removing the color from fiber. The people who did this were bleachers.

Bloom: The brightening of a dye by choice of mordant.

Bottoming: Dyeing cloth one color before overdyeing it to create a second color.

Bucking or bowking: Soaking fabric in an alkaline solution or series of solutions.

Dye: Coloring matter dissolved in solution.

Dye bath, dye liquor: The solution of dyestuffs and water.

Dyestuff: Plant, animal or mineral matter from which dye is extracted.

Fast dye: Dyes that do not appreciably fade over time or under the influence of sunlight.

Fix or fixing a dye: Making a dye permanent or fast.

Fugitive dye: Dyes that fade over time or under the influence of sunlight.

Fulling/fullers: Cloth is impregnated with fuller's earth and pounded, then rinsed. People who do this are fullers.

Grassing or crofting: Laying fabric out on the bleachfield and leaving it for weeks or months while the sun's action bleaches out the color.

Mordant: Chemical, often metallic salt, which assists in the bonding of the dyestuff to the fiber.

Napping/nappers: Finished cloth is brushed to raise the nap, and then the nap is sheared off. People who do this are nappers.

Sadden: The darkening of a dye by the choice of mordant.

Sericine: Silk is composed of sericine and fibroin; sericine is the component that causes the fibers to stick together, and which can prevent dye from being taken up by the fibroin.

Scouring: Cleansing wool.

Souring: Soaking cloth in a slight acidic solution to neutralize the alkaline bleach.

Substantive dyes: Dyes that are fast without need for a mordant.

Vat dye: Dye such as indigo or woad which uses a fermentation process to fix the color.

B. Dyes and Mordants

Abfeilinch: filings, presumably of iron (mentioned in the Innsbruck Manuscript).

Alkanet [*Anchusa tinctoria*]: Source of a somewhat fugitive red dye.

Alum: Probably aluminum ammonium sulfate. Mined as well as found in club moss. Used as a mordant. German term appears to have been "*alaun.*"

Attichpleter: Leaves of the dwarf elder tree (dyestuff mentioned in the Innsbruck Manuscript). Color unknown.

Aychephel: Oak galls (mentioned in the Innsbruck Manuscript).

Bedstraw [*Galium verum*]: The shoots are a source of yellow dye, while the roots are a source of red.

Barberry [*Berberis Vulgaris*]: Source of a somewhat fugitive yellow dye. Mentioned as *Peizzelpaum* in the Innsbruck Manuscript.

Black walnut shells [*Juglans nigra*]: Source of a brown dye. *Nusscheln* (meaning nutshells) are mentioned in the Innsbruck Manuscript, and may refer to the black

walnut.

Blue vitriol: Copper sulfate. Also known as copper vitriol, blue copperas and Roman vitriol. A common mordant. Copper acetate was also used as a mordant.

Brazilwood [*Caesalpinia echinata, C. sappan*]: Source of a fugitive red dye. Mentioned as *Presilig* in the Innsbruck Manuscript.

Buckthorn: Source of a yellow dye.

Cochineal [*Dactylopius coccus*]: Insect ground to produce a red dye.

Copperas: Ferrous sulfate (also known as green copperas). A common mordant.

Cream of Tartar: Potassium hydrogen tartrate or Potassium bitartrate. Used as an "assistant" to mordants, particularly alum.

Dyer's broom aka woodwaxen, greenweed [*Genista tinctoria*]: Source of a yellow dye.

Dyer's sawwort [*Serratula tinctoria*]: Source of a yellow dye.

Fustic [*Chlorophora tinctoria*]: Source of a dull yellow dye. Fustic is native to the Americas.

Holdern: Elder (mentioned in the Innsbruck Manuscript). It is unclear what part of the plant was used and what color was produced.

Indigo [*Indigofera tinctoria, Baptisia t.*]: Source of blue dye. Mentioned in the Innsbruck Manuscript as *Indich*.

Kermes [*Kermes ilicis*]: The female insect is a source of red dye.

Logwood aka Campeachy wood or blackwood [*Haematoxylon campechianum*]: Source of a fugitive lavender and a fast black dyes.

Madder [*Rubia tinctorum*]: The most common source of red dye.

Massalterein/s: Maple (mentioned in the Innsbruck Manuscript). It is unclear which tree is meant. The bark of some maples produces a rosy-tan dye.

Orchil [*Rocella tinctoria*]: Lichen source of purple dye.

Polish berry [*Margarodes polonicus*]: Insect source of red dye.

Potash: Potassium Carbonate. Wood ash.

Safflower [*Carthamus tinctorius*]: Source of a fugitive yellow dye and an insoluble orangish-red dye.

Saffron [*Crocus sativus*]: Source of a well-known yellow dye. It may not actually have been used often as a dyestuff, because of its expense.

Tin: As a mordant, tin brightens colors. Discovered as a mordant in 1630. Likely used in the form of stannous chloride.

Tyrian purple: An ancient dye extracted from some species of the *Purpura* and *Murex* mollusks.

Weld aka dyer's rocket, dyer's weed [*Reseda luteola*]: Most common source of yellow dye.

Woad [*Isatus tinctoria*]: Source of a blue dye, it contains the same colorant as indigo, in much lesser concentration. Erfurt in Thuringia was the center of the German woad industry.

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What Replaces the SRG?

By Leonard Hollar,
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The SRG is the standard muzzle-loading rifle of forces allied with USE. SRG stands for "Struve-Reardon Gevar," named after the manufacturer and designer of the weapon. "Gevar" is the German term for rifle.

It is based on the Pattern 1853 Enfield rifle, one of the most common guns of the American Civil War. It uses a hollow based, pointed bullet of the Minié design which can be quickly loaded as it is smaller than the bore of the rifle and it expands to grip the rifling on firing. The original percussion action has been modified to use a modern "French" flintlock such as was in common use at the time of the American Revolution. The rifle is stocked with a hardwood to within four inches of the muzzle and equipped with a steel ramrod for loading and cleaning. The rifle is slightly over 55 inches in length and weighs slightly more than ten pounds. The rifle is equipped with a tangent style rear sight that allows accurate point shooting to four hundred yards and the sight then flips up to be a ladder sight for shooting at area targets at ranges to eight hundred meters. The rifle is issued with a socket type bayonet with a triangular blade over sixteen inches long. There is a shortened version of the SRG in use with mounted troops and others.

Two things should have stood out in the previous article ("Flint's Lock," *Grantville Gazette,* Vol. 3) about the SRG, the rifle adopted by the USE army in 1633:

1) The SRG is a stopgap weapon, better than any other weapon in Europe at the time, but still not the best that can be made.

2) By its very design the SRG can be copied and maybe even improved by many down-timers, including enemies of the new USE.

So the question becomes: What should replace the SRG?

The first answer that springs to mind is to convert it to a cap or percussion lock. After all, the P-53 Enfield on which the SRG was based was a percussion weapon.

That idea brings up the percussion cap and the action that goes with it. Basically the percussion cap is a simple cup made from any thin metal. Copper is the most common. The inside of this cup is varnished to prevent the metal from reacting with the priming compound. Then a small amount of the priming compound—this could be fulminate of mercury or any other impact sensitive material—is painted in the cap. A second coat of varnish protects the priming compound from moisture.

[We deemed it outside the scope of this article to get into the identity and performance of those impact sensitive priming compounds—fulminates, styphnates, etc. We know they are being worked on. That's one for the chemistry folks.]

The SRG rifle replaces the flash pan of the flintlock with a simple nipple or cone and the complex hammer (holding a flint) with one that has only a hollow face. In action, the rifleman loads his weapon much like he would load the flintlock, but instead of priming the flash pan, he cocks the hammer to half cock and places a cap on the nipple. To fire, the hammer is simply moved to full cock position, aimed and fired. Because capping the rifle takes the extra movement of reaching into the cap pouch when priming, the rate of fire will go down slightly. However, the loaded rifle is more windproof and a lot better in rain or in snowy conditions. It is not completely weatherproof, but it is close. In addition, the percussion rifle has a shorter lock time—the period of time between the shooter squeezing the trigger and the weapon firing. A shorter lock time makes for a more accurate weapon. That means there are some real advantages to going to a percussion version of the SRG.

But are those advantages enough to justify the effort of rearming the whole army? Another point to consider is whether a percussion SRG is that much better than the copies of the flintlock SRG that will soon be in the hands of the enemies of the USE. Remember that the SRG can be made by down-time gun makers, and the French already know about the modern flintlock, which itself was a big improvement on the matchlocks featured in the opening of *1632*.

It should be clear that we feel the gun designers of Grantville should skip a generation of firearms design and go directly to a cartridge breechloader.

But what cartridge breechloader? And, more importantly, what cartridge?

As you might imagine, there is a slight difference of opinion among the members of the panel on this subject. Some of us were holding out for the paper cartridge Sharps design that could later be converted to metallic cartridges. Some wanted to use the tipping chamber of the Hall and later Burnside. Both of these, the Sharps and the Hall, could use paper cartridges with percussion caps.

Other members of the group held out for going straight to a metallic cartridge weapon. Even among the metallic cartridge advocates there are a few differences of opinion. One wants a single-shot dropping block rifle like the Sharps, another wants a single-shot rolling block like the Remington, another wants a tip down rifle based on the single shot shotgun, and one wants to do an add-on hinged-breech to the SRG like the Trapdoor Springfield. All of these actions are strong enough for an effective black powder load and were fairly popular. Examples of each should be in Grantville, since the single-shots are all popular with cowboy action shooters and deer hunters who use single shot rifles.

All of these single-shot designs confer a major military advantage: they allow effective reloading from the prone position. The troops no longer have to expose themselves to enemy fire by standing upright to reload the SRG from the muzzle. This preserves the lives of veterans and allows recruits a better chance of becoming veterans in the first place. But all of the designs except the Trapdoor have the disadvantage of requiring entirely new tooling to produce, thus

delaying their introduction and keeping the troops exposed in the interim.

Still others of us want to skip single shots and go straight to magazine rifles. But the question arises, which magazine rifle: lever action, bolt action or something else? The familiar Winchester lever action is well known and common in the area. Mauser and Lee style actions are the most common bolt-action hunting rifles. Add in the semi-auto SKS and you have the typical hunting rifles of the area. All of these magazine rifles give the prone reloading advantage, but they all require entirely new tooling (and even more of it than the single-shots), so they would increase the time the troops are exposed.

First we will look at the Sharps design. The Sharps designed by Christian Sharps in the 1840s is what is called a sliding block rifle. The breechblock, that part that closes the firing chamber, slides down to open the chamber when the operating lever is moved. Since the breechblock is almost totally enclosed by metal it is a very strong design.

The early Sharps design used a linen or paper cartridge and percussion cap. This cartridge was just a bullet and powder charge wrapped in paper or linen. The paper or linen would usually be impregnated with potassium nitrate for easy ignition and thorough burning. The ignition or priming was provided by a percussion cap on an external nipple, much like any other cap lock rifle of the period. While some early Sharps used a disc primer, where the primer was thrown forward by the movement of the hammer, making the rifle self priming, most of the reproduction rifles do not. The disc primer system was found to be too "fiddly" for hard field usage. Later Sharps used metallic cartridges and were still in production at the time of the Ring of Fire (RoF). In this latter design, the external nipple is replaced by a firing pin, which is driven by the hammer to strike the primer of the cartridge.

The advantages of the Sharps design for the residents of Grantville would be its strength, and the fact that it is a percussion design that could be easily converted to a cartridge rifle. The major disadvantage is it requires very tight tolerances in the machining of the breechblock. It also doesn't allow the user to stay as low while reloading as some of the other designs do.

Another design that has been discussed is the Hall. The Hall is what is called a tipping block action. In this case the breechblock forms the chamber of the rifle and it tips up for loading. In the case of the Hall, the block tips up in the front and is loaded with a paper cartridge, much like that of the Sharps, then the block is lowered to align with the barrel and the weapon is primed, either with a cap or as in earlier versions by priming the pan. The Hall was designed in the 1830s and manufactured at first as a flintlock and later as a caplock rifle.

The advantages of the Hall are its ease of manufacture and the fact it could be manufactured in both flint and percussion versions.

Its disadvantages are that it is a relatively weak design and is not easily converted to use a metallic cartridge.

The third design we discussed was the tip-down. In the tip down, the entire barrel and breech tips out of the action to expose the breech for loading. The most common weapon of this type today is the single barrel shotgun, still about the cheapest hunting arm available. But there are rifles based on this design. The H&R Handi-rifle comes to mind as do a number of survival type weapons. Indeed the Frank Wesson rifle of the 1870s may be thought of as the father of this design. But Wesson based his rifle on an even older design called the Maynard. The Maynard is an oddity in that early models used a metallic cartridge, but had an external nipple for a percussion cap. Later models used a standard style metallic cartridge.

The advantages of this design are its ease of manufacture and the small number of parts.

Another advantage is it could be manufactured as a mixed rifle, like the Maynard, using a metallic cartridge and a percussion cap. Its major disadvantages are it would be hard to strengthen to use a bayonet and it doesn't allow the soldier to stay as low while reloading as some of the alternatives do. Also, while the Maynards had a reputation for accuracy, it is not the most accurate of designs.

A fourth design is the trapdoor Springfield. This design was developed by the United States after the American Civil War to get a cartridge rifle into service while taking maximum advantage of existing stocks of surplus percussion rifled muskets and the existing tooling that had made them. Existing rifle muskets were converted by replacing the breech portion of the barrel with a hinged breechblock that swung up for loading like a trap door, hence the name. The cartridge was fired by a firing pin that extended through the breechblock and was struck by a hammer only slightly modified from that of the rifle musket. New rifles using this system were produced up through the mid 1890s using much of the same tooling that had been used through the Civil War. Only the breechblock itself and the barrels (for later models built around the more efficient .45-70 cartridge) were significantly different from the parts of the previous rifle muskets.

The advantages of this design for the USE are its use of most of the existing SRG tooling and the ability to convert existing SRGs fairly quickly and easily. The disadvantages are two:

1) The action is weaker than the Sharps or rolling block, and thus would be less effective if later converted to smokeless powder.

2) The easiest cartridges to convert to (.577 caliber with existing SRG barrels or .50-70 with sleeved SRG barrels) are not the most efficient black powder cartridges for longer ranges.

The final design of a single shot rifle we will discuss in this report is the Remington rolling block. As its name implies, the breechblock in the Remington design rolls back in the action to expose the chamber. The block is hinged on a pin through the walls of the breech. This pin is slightly off center, and thus the breechblock pivots downward when it is opened. At first glance the Remington does not look like a strong design, but it is. The breechblock is locked in a closed position by both the nose of the hammer, which fits into a slight recess in the breechblock, and by an extension of the lower part of the hammer which extends under the block.

The advantages of the rolling block design are its strength and its simplicity of manufacture. Its major disadvantage is that it requires a metallic cartridge, because there is no positive sealing of the breech.

Now we want to look at repeater designs. Repeating rifles are another force multiplier, like the organ gun discussed in our prior article ("How to Make a Machine Gun in 1634 with Available Technology; Alternate Views," *Grantville Gazette,* Vol.4). One squad with repeating rifles will handily out-gun two or three squads armed with single-shot rifles. This is the type of weapon that the USE needs to produce a smaller, better army.

The basic lever-action rifle needs no introduction. It has been seen in movies and television for years. Also it is very common as a deer rifle in the area of Grantville. Basically it works by moving the lever under the action. This opens the breech, ejects the spent cartridge from the chamber, pulls a new cartridge from the magazine, and chambers it, making the rifle ready for firing. Its speed and ease of operation has been proven by American hunters for well over one hundred and fifty years. But the lever action has its drawbacks. One is that it has many parts that are fitted under very close tolerances. If it has a tubular magazine, it is restricted to round-nose bullets. Round-nose bullets are not as accurate as pointed ones and lose velocity more rapidly. It

also cannot be used as well from the prone position as the other repeater designs discussed below.

Bolt action rifles are another possible repeater. The Mauser-based designs are quite common and Lee-Enfields are common as surplus rifles converted to sporting use. The major difference between the two is the location of the locking lugs. The locking lugs are those projections on the bolt that hold it against the recoiling cartridge case when firing the rifle. Both are very strong actions and both were designed in the time when black powder cartridges were common. As a side note the American Springfield of 1903 is a Mauser-based rifle. They have a lot of advantages. They are strong, accurate, and easy to design to be fitted with a bayonet. And as the later versions of both designs prove (SMLE #4, Springfield 03-A3, and VG-1 Mauser), they can be produced with a minimum number of parts in small shops.

Another possibility is the SKS. The modern SKS uses a bit of high-pressure gas from the firing of the cartridge to move the bolt back, extracting the fired cartridge; and has a large spring that returns the bolt forward, picking up the new cartridge from its ten-shot magazine on the way. Black powder would foul such a gas system almost immediately, and cleaner-burning smokeless powder won't be available until very pure acids and reagents are available—probably at least ten years from 1632. But if the gas system was eliminated, a human hand could cycle the bolt easily enough.

A black powder SKS could later be adapted for smokeless powder and semi-automatic operation—not that many of the rifles would be so adapted, but the tooling, design, and machinery would not have to be replaced when better cartridge design and propellant availability would make a black powder straight pull rifle obsolete.

The SKS uses the classic 7.62x39 cartridge. This relatively small cartridge has plenty of power with the higher-energy smokeless power, but would be underpowered with black powder, so a new cartridge would be needed. It should be about .38-45 caliber, and long enough to produce sufficient velocities with black powder. A straight case about two inches long would be ideal. The base would need to be at least semi-rimless because a rimless case starts becoming harder to chamber as black powder fouling builds up, and a manual SKS action doesn't have the camming action that allows a turn-bolt to overcome this resistance. A semi-rimless case could still allow easy feeding while head spacing on the rim rather than the shoulder.

A shortened version of this round could also be used in pistols.

The major drawback of any magazine rifle we can think of for the 163x timeframe is that all would require very uniform cartridges. A few hundredths of an inch short or long could jam the gun.

Which brings us to metallic cartridges.

The modern metallic cartridge looks simple, but it really performs a complex job.

A cartridge has three functions:

1) It acts as a carrier of the powder, primer and shot, keeping them together and protected from the elements.

2) It acts as a seal for the firing chamber.

3) It acts as a heat sink and carries some of the heat of the burning powder away from the firearm.

The basic design is indeed simple: a metal tube closed on one end, with a bullet on the other. The closed end is called the base of the cartridge and in most designs is not really closed but has a pocket drilled in it. This pocket is called the primer pocket and, as you might guess, is where the primer goes. The primer pocket is connected to the interior of the cartridge by either a single hole or a series of smaller holes. These holes, called flash holes, allow the fire from the primer to reach the powder charge in the cartridge. When the flame of the primer reaches the powder charge the charge ignites and the gasses released push the bullet down the barrel and toward the target.

A loaded round consists of the cartridge case, the bullet, the powder charge and the primer. Sometimes if the case is large and the powder charge is small, there may also be a filler to fill the empty space inside the case.

Let's look at the base of the case. If the case has a rim or lip around the base it is called a rimmed case, such as the .30-30, .38 Special and .45 Long Colt. If the case has no rim but instead a groove cut around the base it is called rimless, such as the .223, .308 and .45ACP. If it has a very small rim and a groove it is called semi-rimmed. The rim and the groove are both used to extract or pull the cartridge out of the firearm. As you might expect, the piece of the rifle that extracts the cartridge is called the extractor. There are two types of cartridge which it is hoped the citizens of Grantville will avoid, but they probably won't. These are the rebated, where the base is smaller than the body of the cartridge: this is found in the modern .41 Action Express. And the belted, where a belt, or extra thick ring is formed around the cartridge just in front of the extracting groove. Belted cartridges are found today in a number of high-powered rifle cartridges such as the .375 Holland and Holland, the .458 Winchester and the .460 Weatherby.

Rimmed cases work best in single shot designs and rimless cases work best in magazine designs. It is of course possible to make a rimless cartridge work in a single shot or a rimmed case work in a magazine design, but it takes a little extra design work. The rim around the base of a rimmed cartridge stops the cartridge from going too far into the chamber of the rifle and positions the base or head of the cartridge where it can be supported by the bolt and struck by the firing pin. This positioning is called head space. Rimless cartridges head space upon their shoulders, that portion of the front of the case where it narrows down to the neck that accepts and holds the bullet. It is likely that black powder fouling will give trouble in this area. This fouling would prevent chambering a new cartridge very quickly. This is even more of a consideration for machine gun use.

Now we will move toward the other end of the case. The body of the case will, in most cartridges, have a slight taper to aid extraction. The front of the case is the next area we need to look at. If the case is relatively the same size from the base to the bullet, the case is called a straight case. We know it has a very slight taper but it is still called straight. If, on the other hand, the bullet is much smaller than the case and the case is squeezed down to hold it, this is called a bottlenecked case, or necked case. Examples of a straight case are the .45-70, .30 carbine and most pistol cases. Examples of necked cases are the .30-06, 8mm Mauser and most modern rifle cartridges. Necked cases allow greater powder charges without making the cartridge case overly long and fragile, and aid in "internal ballistics"—how well the powder burns inside the cartridge case.

The bullet is held in the mouth of the cartridge and may be either lead or jacketed lead. If jacketed, it has a thin layer of copper around it to protect the bore of the rifle from lead fouling. Lead fouling is lead scraped off the bullet as it goes down the barrel, and can affect the accuracy of the weapon. The faster the bullet goes, the more chance of fouling. So with a necked case and

a heavy powder charge, a jacketed bullet may become a necessity.

The cartridge case can be made from a number of different metals, but a mix of 70% copper and 30% zinc with some trace elements has been found to be the best. (Today, it's commonly called "cartridge brass.") Pure copper cases tend to be too soft and steel cases give problems in forming and can scratch gun chambers.

[One other topic that we decided was outside the scope of this article is the availability and production of brass. At the time of the RoF, zinc was not known as a separate element, mostly because its boiling point was higher than the melting point of its ore. But—vastly oversimplifying—the zinc ore mixed with melted copper would produce brass, and this had been known since Roman times.]

Now what size of cartridge?

Again the firearms round table has major differences of opinion. Some want a straight copy of some of the famous black powder cartridges. Others want a new design.

One thing to keep in mind is black-powder fouling. Those tiny pieces of carbon and unburned sulfur will soon coat the inside of the barrel and can reduce accuracy very quickly. If the rifle is not cleaned regularly, this fouling will attract moisture and rust, soon destroying any accuracy the rifle ever had. The smaller the bore of the rifle the sooner the fouling has an effect on accuracy. So for this reason, along with others, most of us agree that any rifle chosen should have a bore size equal to or greater than .30 and that .35 or larger would be better.

Some of the sizes that have been mentioned are:

The .45-70 which is an excellent choice in that there are undoubtedly examples on hand since it was making a comeback as a hunting round at the time of the Ring of Fire The .45-70 was the standard American military cartridge for over twenty years. It is 2.1 inches long, rimmed, and is called a straight-wall cartridge (almost straight; a little body taper aids feeding and limits powder fouling being blown back into the action).

A .577 or .58 caliber straight-walled cartridge for use in a trapdoor conversion of the SRG with existing barrels or new barrels made on existing SRG tooling. The British used a cartridge of this type in their Snyder conversion of their Enfield rifle muskets, and it had a reputation as a highly effective round. But it suffers somewhat in long-range performance in comparison to smaller caliber cartridges such as the .45-70 and wouldn't work nearly as well for machine guns.

We have already mentioned the new cartridge formed by necking up the 7.62x39mm to a larger caliber. It should be noted that the Russians have done exactly that with their 9x39mm which was just coming into use as a sporting and military round at the time of the Ring of Fire. As a black powder number this should give a hitting power close to the old .38-40 Winchester cartridge, which was an excellent hunting caliber for medium game.

Both the .32 Winchester and .38-55 Winchester have been discussed amongst the group. Both of these were originally black powder numbers and can be formed from a standard .30-30 case. Both have a reputation as proven "game-getters" and hunting rounds.

Another caliber discussed is to make a case that matches the .30-06 in base size, either rimmed or rimless, and neck it to take a .375 caliber bullet. This would closely match the 9.5x60mm Turkish Mauser cartridge, which was an excellent military cartridge designed right at

the end of the black powder era on our time line.

As you can see, we at the firearms round table have given Eric and the other writers in the 1632 series a lot of choices, but very little cohesive advice on choosing the new SRG-2. It is said that if you get six gun people in a group they will give you ten opinions. We proved that to be true.

So here are our individual opinions: *(In alphabetical order)*

Leonard Hollar: Here's a thought. There is, and has been since the 1980s, a form of black powder firearm called the in-line rifle. These things are, at least as nearly as I can tell, a hybridization of a bolt action rifle and a muzzle-loader. The powder and shot are loaded from the muzzle and a bolt is worked at the breech end to insert a cap (Or, in some cases, a disk.) When the trigger is pulled a firing pin is struck and the rifle fires. Well, yeah, I know, that's really over simplified but bear with me for a minute, please.

What if . . . These rifles were manufactured with the ability to modify them as other technology catches up. Use a standard bolt, as would be used with cartridges, but with the bolt face modified to hold a cap as the in-line does now. The breech is designed so that it could be drilled out to form the chamber for a cartridge at a later time. The area in the stock below the bolt could be gouged out to accept the parts for a magazine and then covered over with a plate to insure proper bolt operation. I even believe that by using preloaded cartridges made of stiffened paper, with a copper washer for a gas seal included in the wrapping, the rifle could be built as a single shot breechloader from the start and then converted to metallic cartridges when they become available in mass quantities by changing the bolt and installing the magazine hardware.

Bob Hollingsworth: I think the SRG replacement should be a single shot and more specifically either the Remington rolling block or the Martini/Peabody type using a .375 caliber bullet and load much like the 9.5 mm Turkish Mauser. I believe that the difference in the amount of machine time and different materials needed to produce a repeater can best be used building additional individual rifles, and improving USE crew-served weapons. With the advent of serviceable self-contained metallic ammunition, more machine guns become do-able, even with black powder propellants. In test after test, machine guns have been shown to out-perform much larger groups of individual marksmen. I should much rather field sixty single shot armed men with a supporting Gatling gun than a like number of men with bolt action repeaters without the Gatling or its analog. Should the decision be made to retain .58 caliber bore size and ballistics not dissimilar to the current SRG performance, then modification of SRGs to make trapdoor style single shots is the preferred follow-on weapon. It must be recognized that this will limit the effectiveness of any machine gun that must use the standard rifle ammunition.

John Rigby: I feel that the USE should begin development of a single shot breech-loading firearm based on the H&R break open shotgun/rifle design. This action is of simple design and has the advantage of a separate barrel assembly which will allow a single action type to be used in a variety of roles (battle rifle, shotgun, sharpshooter's rifle, etc.). A variety of examples of these weapons should exist in the RoF to use as patterns. I also feel that the SKS is a weapon

worth building and that some manufacturing time should be committed to it, initially to work out the tooling and develop some prototypes for testing. As the SKS became viable the single shot rifles could be moved to secondary troops and the barrels replaced with ones which would take the SKS ammo.

Philip Schillawski: The primary military benefit of a breechloader is allowing the soldier to reload from the prone position. This benefit is so massive in terms of preserving troops that I think it outweighs all the other factors in deciding when and with which design to replace the SRG. I don't think cartridge production will take that long to accomplish, so I recommend going with the trapdoor design immediately upon sufficient cartridge production being available. To minimize the time to get the breechloaders in the hands of the troops, I'd start by switching all new rifle production to .577 trapdoors, and converting existing stocks of SRGs as rapidly as possible.

Only after all the soldiers in the army no longer have to stand up to reload would I consider a completely new design. At that point, I would go with a Lee bolt action because I think the need to redesign the SKS to use longer, rimmed cartridges with black powder makes going the SKS route a long-term proposition. The Lee action achieves the highest rate of fire of any hand-powered action. The rear locking lugs of the Lee design make cleaning and swabbing out the chamber area much easier (and without removing the bolt) than is possible with a front-lug action like the Mauser, a considerable advantage for a black powder (BP) rifle. The machining of a Lee action is also about as simple as is possible for a bolt-action. The rifle could be initially produced using a rimmed BP cartridge—just neck up the .303 British—and changed to smokeless powder when that option becomes available. (The rifle could be easily converted to a rimless cartridge at this point as the Lee bolt has a replaceable front component and it is necessary to do barrel replacements at this point anyway to change to a smokeless rifling twist from the BP rifling twist).

Tom Van Natta: I favor going straight to a repeater. Tooling up to make a rifle of any type is a significant investment, because it means no rifles are being produced in this period, and costs quite a bit of money. The plan with the least retooling, a good initial rifle, and the best future rifle without extensive retooling is a SKS-type, initially with the human hand powering the repeating part, in the future with smokeless propellant gasses turning it into a semi-automatic or full automatic rifle. The SKS is the immediate predecessor to the AK-47, the most popular rifle ever made.

John Zeek: I favor the .375 SJ, that cartridge based on a rimmed .30-06 case that has been necked up to .375. I also think the USE should adopt not one new rifle but two. One would be the standard infantry rifle and would be based on the rolling block design. This rifle could be manufactured by many down-time gun makers and would arm the majority of the army. A carbine for mounted troops could be based on the same design. The other design I like is a copy of the Lee bolt action. This could be manufactured in the shops in Grantville and in down-time shops that had been equipped with more modern machinery. Again a carbine to the same design is possible. I also like the idea of a black powder modified SKS for the *existing* SKS rifles only. They could be used as special issue weapons for marines or naval boarding parties that need a lot of firepower.

In conclusion, it's apparent that we don't agree now. But we are still working and in future articles we will strive to come, eventually, to a logical, well-thought-out replacement for the SRG.

Comment by Eric Flint:

They probably never will agree. Why should they? The human race has now had centuries of experience with gunpowder weapons, in the course of which umpteen jillion variations have been produced, all with their own advocates and detractors—not to mention manufacturers and buyers.

I've never seen any reason that a fictional universe should be any neater and tidier than the real one, leaving aside the obvious need to simplify a story somewhat to make the plot coherent. I imagine what we'll see in the 1632 universe, when it comes to which guns get developed, is much the same as we've seen in the real world: Some people go ahead and make Gun X and others make Gun Y and still others make Gun Z, and then they get used (or not used) by Armies A or B or C depending on factors I, II, and III.

(Not to mention corruption, bribery, etc., etc.)

The great value of these ongoing discussions and debates by the firearms round table is not so much the conclusions they come to—or don't, as often as not—it's the discussion itself. That allows me or any other writer in the series to make an intelligent and informed decision whenever we decide that the storyline needs to introduce a new element concerning firearms. Instead of sucking it out of our thumb by inventing a weapon that any knowledgeable person would instantly recognize as ridiculous.

The Grantville Brickmaker's Primer

By Kerryn Offord

[Author's note: This article assumes that there are two thousand pounds to the ton, and a standard construction brick with pointing is 9" x 4.5" x 3" (121.5 cubic inches) and weighs eight pounds.]

Making bricks is easy you say. Mankind has been making them for millennia. You dig up some clay, mold it to the desired shape, and then fire it until it is hard. Easy, straightforward, anybody could do it. Right?

Wrong. Problems can occur in the preparation of the clay, the molding of the bricks, the drying of the bricks and the firing of the bricks. If any step is not performed correctly, then the finished product will be unsatisfactory.

Take the early European colonies in American as an example. In 1633 Wouter Van Twiller, the governor appointed by the Dutch West Indian Company, started construction of his private residence on Manhattan Island. This fact is interesting not just because it was the first brick building in America, but that the bricks were all imported from Amsterdam. This suggests that the colony was unable to produce good quality bricks. We find that fired bricks probably weren't produced in America until 1650 when the New Haven colony fired their first bricks. It's not that the colonists didn't try to make bricks earlier. Rather, the problem is that until New Haven in 1650, they didn't have any brickmakers, and the earlier attempts resulted in inferior bricks that were mostly unsuitable for construction. Having people who know what they are doing is important for the production of useful construction bricks. This is a problem facing the people of Grantville. Brickmaking in the Grantville area of West Virginia died out in the late nineteenth century, so there is little chance any current resident has sufficient experience of brickmaking to be useful. This means that Grantville will be depending on the skills of down-timer brickmakers.

This presents a new problem. Brick is not a popular construction material in Thuringia, the area in Germany where Grantville has been deposited by the Assiti shard. This means that there will be few brickmakers near Grantville, but more importantly for the short term, there will be no infrastructure in place for the production of bricks in volume. There will be no large stockpiles of clay dug up last autumn and left to weather over the winter. There will be no drying sheds, nor will there be permanent kilns. Worse still, there will be insufficient dry wood, the fuel of choice

until the nineteenth century, available for firing bricks. Any brickmakers in the area will be refugees or itinerant brickmakers moving from job to job. Either way, without up-time assistance, they will be unable to produce bricks in any volume until the brickmaking season of 1632.

The brickmaker is responsible for the following tasks:

Preparation of brick earth.

Molding of the bricks.

Drying of the freshly molded bricks.

Firing of the dry bricks.

1) Preparation of brick earth

Earths (the technical term used to refer to soils as opposed to rocks) suitable for brickmaking fall into three principal classes:

1) Plastic or strong clays, which are chiefly a silicate of alumina. Often called *Foul clays* by the workmen because of the odor they give off, they are also known as *Pure clays*

2) *Loams* and mild clays are those with a considerable proportion of sand intermixed.

3) *Marls* or calcareous clays are, as the name suggests, clays containing a notable proportion of carbonate of lime.

As both the Grantville area of West Virginia and Thuringia abound in suitable earths a down-time brickmaker will easily locate clay suitable for brickmaking within or close to the Ring of Fire, He will then have to prepare it for molding. It is rare to find naturally occurring clay that is suitable for brickmaking. Thus the preparation of clay becomes an important step. Our skilled brickmaker will examine the available earths and decide what has to be added to it for successful brickmaking. The pure clays require the addition of sand or loam, while the loams often need the addition of lime to flux and bind the earth. Pure clay or clays with little sand content will shrink and crack while drying no matter how carefully and slowly the bricks are dried. They will not stand firing, as a red heat will cause the mass to rend and warp. To overcome this problem substances that do not combine with water and do not contract when heated are mixed with the clays. It is common practice to mix in ground-up burnt clay (grog) from failed bricks. This is especially true when making fire bricks, as the fire clay tends to be expensive. For example, considerable savings can be made by mixing two parts by weight of burnt clay to one part Stourbridge clay to produce a good firebrick.

Once the brickmaker has located a suitable supply of clay and decided what to add to make it suitable for brickmaking, he has to extract the clay and then prepare it. Digging the clay and transporting it to where the bricks are to be made and fired is going to be labor intensive. It takes about two cubic yards of clay to make one thousand bricks. A single *pallet molding* team consisting of a molder and three or more assistants can mold and lay out to dry something like three to five thousand bricks per fourteen hour day. Just to keep one team working, the clay diggers are going to have to dig six to ten cubic yards per day of brick making. A single worker can dig wet clay (as opposed to mining dry clay) at about fifteen cubic feet per hour. At this rate, ten cubic yards requires eighteen man-hours of digging.

Before the introduction of large-scale mechanization, clay was usually dug in the autumn. It was then transported to a level place prepared to receive it and left in heaps several feet high to

weather over the winter. The winter frosts would help break up and crumble the lumps. Clay that has been dug in the spring will not have benefited from the frost action and, apparently, will produce inferior bricks. The object of the weathering process is to open the pores of the clay and to separate the particles so that the clay can absorb water more readily when it is mellowed (made pliable and plastic).

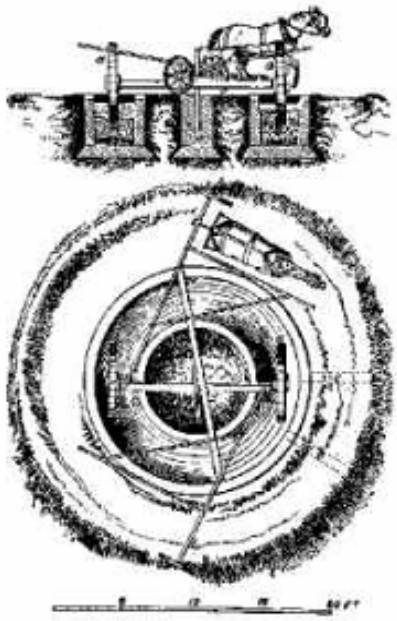
At the start of the next brickmaking season, which normally starts in April, the clay is removed from the heaps and thrown into treading pits where water is added, and with a combination of spade labor and treading by barefooted humans and animals, the clay is tempered to the desired plasticity. Throughout the tempering process any stones that may be found in the clay must be carefully picked out by hand. This is a tedious and time consuming operation, but one which cannot be neglected, as the presence of a pebble in a brick will result in an unsatisfactory brick. Usually the different density of the pebble compared to the clay will result in cracking of the brick.

For earths that contain a lot of gravel the only option is to wash them and run them over a grating so sufficiently fine that not even small stones can pass through. The liquid pulp has to then be run into a pit that is prepared for it and left until sufficient water has evaporated. This process produces clay that is perfectly uniform in texture throughout the mix. However, it is expensive to prepare and therefore to be avoided unless the bricks you are making require the perfectly uniform texture, such as in cutting, or rubbing bricks. Rubbing bricks are laid with almost no mortar between them, and are "rubbed" or cut to give a very close fit, such as in gauged arches.

When working with *marls* care must be taken that no lumps of limestone survive the tempering process. Even a piece of limestone no bigger than a pea in a molded brick is sufficient to destroy that brick. The carbolic acid is driven off by the heat of the kiln and forces a vent through the side of the brick. This creates a cavity that water can enter. The first sharp frost this brick is exposed to will freeze water in the cavity and will generally be sufficient to destroy the face. Over time the entire brick will disintegrate as the exposed area takes in water that will freeze and thaw.

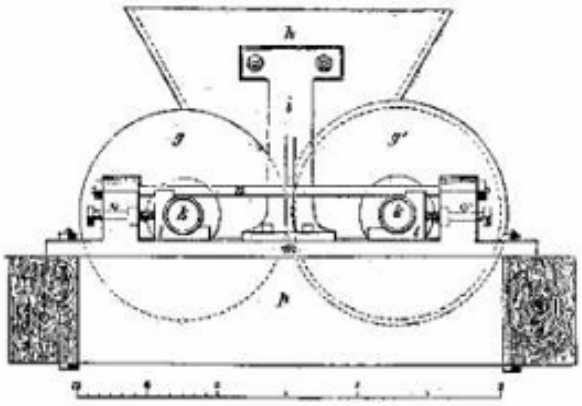
The people from Grantville can contribute to the preparation of the earths in a number of ways. Principally, their contribution will be finding ways to mechanize the processes. When it comes to digging the clay, the introduction of mechanical diggers will not only increase the rate at which clay can be dug and loaded onto wagons and carts, but it will also extend the digging season. In seventeenth-century Europe the earths are dug in the autumn for a number of reasons. Probably the most important reason is that autumn digging allows weathering over the winter. During the summer the laborers who could be digging clay will be busy tempering the previous year's clay. This leaves only autumn and winter for digging. Winter digging is not desirable as not only does it reduce the amount of weathering the clay can undergo, but also there are the problems associated with trying to dig in wet and maybe frozen earth using wooden or poor iron shovels. Not only will the laborers have difficulty digging, but also standing in wet earth under winter conditions for hours on end will damage their health.

Figure 1. Grinding clay in a ring pit. (*Dobson*)



Mechanization of the digging process means that we now have earths being delivered to the brickworks right through the year. This means that not all the earth will benefit from weathering. We know that this will result in inferior bricks. Therefore something has to be done to replicate the weathering process. The easiest methods of breaking down the earth, and for that matter, any small stones and clumps of limestone, is to use the grinding mill.

Figure 2. A single pair of rollers for crushing clay. *g* and *g'* are the two counter rotating rollers. *h* is the feed hopper, *i* is the separation distance between the rollers. (*Dobson*)



The simplest grinding-mill consists of a ring-pit around which a draft animal drags a heavy cast-iron roller (figure 1). Clay is spread around in the pit and the roller is repeatedly rolled over the clay. Water and additional earths such as sand are added until the clay is the desired plasticity. Men then empty the pit with shovels. Because the pit is out of service while being emptied it is useful to have more than one ring-pit, allowing grinding to continue. An alternative to the ring pit is to use pairs of counter rotating cast-iron rollers arranged similar to an old-time wringer or mangle to crush clay, stones, and lumps of limestone (figure 2). It has several advantages over the ring-pit: first, it uses much less land, and second, it is an all-in-one process. Instead of loading the pit, grinding the clay, then unloading the pit, the pairs of counter-rotating rollers allow raw clay

to fall through the machine, compressing the clay and crushing anything larger than the separation gap between the rollers. With multiple pairs of rollers, the separation gap can be reduced pair by pair until the final pair is almost touching. The resulting product is not as good as that from a ring pit, but it is usually good enough for most purposes, and more importantly, it is cheaper than using the ring-pit. Clay going through the counter-rotating rollers will still have to go through a pug mill, but by placing the pug mill below the roller arrangement the clay can fall directly into the pug mill, greatly reducing the amount of handling, and thus the cost of brickmaking.

The pug mill can either be used on it's own, when earths are known to be free of stones and limestone lumps, or used in conjunction with the grinding mill. A pug mill is usually a cylindrical vessel with a central shaft that holds a number of knives, which by their motion, cut and knead the clay. The knives are arranged so that the clay is gradually forced through the mill so that the finished product is thoroughly tempered ready for molding, and is similar in principal to a kitchen mincer. It is possible to have twin-shaft pug mills. The counter-rotating shafts temper the clay more efficiently than a single shaft, but the arrangement of the shafts, and the casing surrounding them are more complex. Energy to rotate the rollers of the grinding mill, or the shaft or shafts of a pug mill can be provided by draft animals pulling a sweep, water wheels, windmills, or some type of engine, either an internal combustion engine or a steam engine.

2) Molding of the bricks

There are two methods of hand molding that may be current in seventeenth-century Europe. They are *slop molding* and *pallet molding*. The difference between the two is principally in the release agent used to prevent the clay adhering to the mold. In slop molding the mold is dipped in water from time to time, while in pallet molding the mold is sanded, rather like flour is used as a release agent in baking. Generally the slop molder needs at least two molds, while the pallet molder makes each brick with the same mold. It appears that there is little difference between the two methods in terms of product quality, and except for having a wetter surface on the brick, which means it can't be immediately tipped out of the mold and then hacked, there is little difference in how the bricks are handled. The following is a description of pallet molding.

The pallet molder makes his new brick by throwing a clot of clay forcefully into the mold using a two-handed throw. Using the hands to force the clay into the corners of the mold is undesirable, as it changes the density of the clay in that area and any uneven pressure exerted in forming the brick will show up as distortions in its shape as it dries or is fired. The molder then uses a *strike* to level off any surplus clay before turning out the molded brick onto a pallet. The pallet, a small board slightly larger than the brick, is then put to one side for an assistant to put onto a hack-barrow. When the barrow is full it is wheeled off to the drying ground where the bricks are stacked for drying (except for the case of bricks to be fired in a clamp or scove, where the bricks are taken to the hacking-ground and stacked into hacks). Our single pallet molder can keep two people wheeling barrows (wheelers) constantly employed, with two barrows being always in work while a third is being loaded at the molding stool. The drying floor for a brickworks producing over thirty thousand bricks a week can cover a large area, so it is not uncommon for bricks to be wheeled over fifty yards from the molding stool to where they will be stacked for drying.

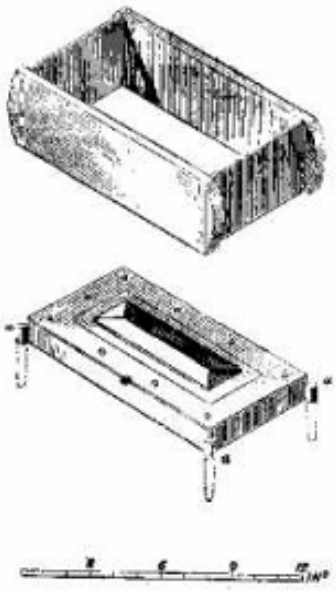
In wet climates such as can be expected in Germany, the drying area should be under cover to

protect the green bricks from rain or sun. The direct impact of rain can break up bricks, or at least cause uneven drying, while direct exposure to the sun can result in uneven drying, which can cause the brick to distort as it dries. Walls on a drying shed help to prevent unequal drying caused by uncontrolled air currents, and when a heated drying shed is used, the walls help retain the heated air.

A slop molder follows almost the same procedure, except that the molder doesn't tip the brick out of the mold onto a pallet. Instead, an assistant takes the mold to the drying floor and tips it out there before returning with the mold. The effect of this is that the distance between the molder and the drying floor can't be too far, otherwise the molder is left waiting for a mold, or too many people are employed to carry away molds for it to be economical.

The first improvement Grantville can bring to brickmakers is the introduction of a *kick* to the bottom of the mold (figure 3). Also known as a frog, the kick is a rectangular block of wood or metal, smaller than the mold dimensions, that is screwed onto the bottom of the mold. Sometimes letters were carved in the kick to identify the brickyard owner. It is a raised area on the bottom of the mold that creates a hollow in the newly made brick. When the clot is thrown into a flat-bottom mold it sometimes fails to fill the edges where the sides meet the bottom. The molder then has to take remedial action when the brick is turned out onto the pallet, taking up valuable time and reducing production. How does the kick force the clay from the thrown clot into the corners? A clot of clay hitting the flat bottom of a mold with force can go no lower, so the clay starts to spread out towards the sides. There may not be sufficient force applied to the clay to get the clay into the corners of the mold, especially those at the bottom of the mold. The kick encourages the clay to flow into these bottom corners as it can still move down even after hitting the kick. The presence of the kick reduces the number of occasions when the clay fails to reach the edges, increasing the number of good bricks made in a given period. I cannot confirm that the kick wasn't in use in the seventeenth century, however, there is evidence that even as late as the late eighteenth century American brickmakers were still hand molding bricks without a kick.

Figure 3. A Brick mold with bottom plate. Note the raised kick. The pins '*a*' are to secure the bottom plate to the molding table. (*Dobson*)



Mechanization of brickmaking can come from two directions. Either the throwing of the clots can be mechanized, or bricks can be extruded. Mechanical clot throwing is a relatively modern technology and is probably beyond the capabilities of Grantville for many years. In the meantime, there is nothing mechanized clot throwing can do that can't be replicated by employing more hand molders. Extruded brick though, that offers new opportunities. A brick extruder nozzle can be attached to the end of our existing mechanical pug mill. Clay will then be extruded in the shape of the nozzle as a continuous block of tempered clay. In our case, a block nine inches wide and four and a half inches high. This continuous block of clay can then be cut into three-inch slices using a thin wire. The bricks are then placed on a pallet and transported to the drying shed. An extruder made out of cast-iron and weighing about four tons powered by a ten horsepower steam engine is capable of taking raw clay and pumping out up to ninety thousand bricks a week. Which looks good, until you realize that is about the same as three molding teams. There is a saving in labor, but in seventeenth-century Germany labor isn't exactly rare or expensive. So why would you want to make a considerable capital investment in a combined grinding mill, pug mill, brick extruder?

There are two reasons. First, the mechanical brickmaker tempers its own clay. The second reason, and one that makes developing extruder nozzles worth while, is the manufacture of "hollow bricks." Hand molders can't easily make bricks with holes, while an extruder just needs a slightly modified nozzle to go from solid brick to hollow brick. Hollow brick will be in demand for several reasons. The hollow bricks can be for ventilation, or insulation, or steel reinforcing can be threaded through the holes. Whatever the reason, for the same volume of wall, hollow bricks will be considerably lighter than solid bricks. The lighter brick is less fatiguing to handle, and mortar adheres to the textured surface better than to a smooth surface. These two characteristics make the bricklayer's job easier. There are savings to the brickmaker as well. First, less clay is used to produce the same volume of brick (the space occupied by the brick). Second, the hollow nature of the brick means that no particle of clay is now much more than half an inch from the heat. The heat now only has to penetrate about half an inch, as opposed to an inch and a half for a solid brick. This means bricks naturally dry and fire faster. This leads to a saving in fuel to fire the bricks. The savings in clay, and the reduction in firing time and the fuel required to fire the hollow bricks produces considerable savings and can significantly reduce the cost of making the bricks. Also, the same extruder technology can be utilized to form concrete blocks once we start using concrete for construction.

Of course things aren't going to be easy. As the clay is extruded through the nozzle the edges of the clay tend to catch on the edges, and especially the corners, of the nozzle. This results in bricks that distort as they dry. The answer is, of course, to lubricate the clay with a little water as it passes through the nozzle. For our heroes in Grantville, learning how to do this will be an exercise in trial and error. Assuming they even know what the problem is.

An additional benefit of the extruder nozzle is that, once we have it working properly, we aren't restricted as to its shape. This means we can easily convert our brick extruder to extrude other products. Realistically, we can use a single machine type to make different sized bricks, roofing tiles, and sewer pipe, just by supplying a range of extruder nozzles.

3) Drying of the freshly molded bricks

Freshly made bricks are referred to as "green' bricks." Usually they will contain too much

water for immediate burning in a kiln. This water has to either dry off naturally before they are put into the kiln, or valuable fuel is consumed drying the bricks in the kiln. For this reason, green bricks are usually set out on a drying floor or in a drying shed where they are allowed to dry uniformly to the point where they can be safely handled without damaging them. They are then *hacked* (more on kilns and the different types in the next section). Hacking involves taking the bricks from the drying surface, where they are only one deep, and stacking them edge on edge in a hacking ground for further drying. How bricks are dried before being placed in a kiln depends on how they are to be fired. Bricks that are to be fired in clamps or scoves are usually pallet molded and hacked straight off the hack-barrow rather than being set out on the drying floor. These bricks must be drier than those to be fired in a kiln. This is because clamps and scoves attain their maximum heat almost immediately and cannot be regulated. So anybody intending to use clamps or scoves to fire their bricks must ensure the bricks are properly dry. This can mean a stay on the hacking floor ground of several weeks.

In Germany it will probably be impossible to air dry bricks throughout the year. For this reason heated drying sheds should be used. A heated drying shed has walls and a roof to keep the heat in. It also has a heated floor. Hot air is sent along the floor, and sometimes up the walls, through vents. Ideally we want sheets of iron over a floor of channels, much like Roman central heating. The hot air heats the iron, which heats the air in the drying shed, which in turn warms the bricks, drying them. A drying shed will require a fire to heat it, although waste heat from kilns might be used.

4) Firing of the dry bricks

Why do we have to fire bricks? What is wrong with sun dried bricks? Water is the problem. Water can either wash away the clay, or crack open the brick when it freezes. The objective in firing bricks is to create a hard brick with a weather resistant finish. Terra-cotta bricks can be made, but they will lack the glaze of silicate of alumina based bricks, and will need a second glazing firing to make them weather resistant.

The burning or firing of bricks is the most important factor in brickmaking. Their strength and durability depend on the style of firing and the degree of firing to which they have been subjected. Firing is supposed to bring about certain chemical decompositions and recombinations that entirely change the physical character of the dry clay. The finishing temperatures (the temperature that the bricks must be exposed to for them to fire properly) range between 900° C to 1250° C (1652-2192° F), with a usual temperature of about 1050° C (1922° F) for ordinary construction bricks. Fire bricks need something like 1250-1500° C (2192-2732° F).

Table 1. A list of different methods of firing bricks, giving their fuel consumption to fire 1000 bricks. Methods are ranked in decreasing proportions of over or under cooked and broken bricks.

Kiln Type	Capacity (1,000s)		Firing failures (average)	Bituminous coal to fire 1000 bricks – range (tons)	Investment Cost $US (1993)
	Per Firing	Per day			
1) Clamp	5-1,000		20%	0.30-1.20	n/a
2) Scove	5-100		20%	0.30-1.20	n/a
3) Up Draft	5-40		12%	0.30-1.20	< 5
4) Down Draft	10-40		10%	0.30-0.90	< 20
5) Bull's Trench		10-48	12%	0.23-0.42	> 7
6) Tunnel		50-150	10%	0.18-0.37	> 1,000
7) Hoffmann		4-30	5%	0.23-0.42	> 80
8) VSBK		4-30	2%	0.10-0.13	> 4
Adapted from Status and Development Issues of the Brick Industry in Asia. Food and Agriculture Organisation of the UN. Field Document No.35. April 1993.					

The brickmaker brings knowledge based on experience to the firing of bricks. The first task is to correctly arrange the bricks within the kiln (known as *setting* the bricks). Bricks have to be carefully stacked in the kiln to ensure an even distribution of heat. This means bricks have a finger-width space between them. Bricks are stacked in pairs with faces in contact. This is done to produce clean-surfaced faces for cosmetic reasons. If bricks were arranged in rows with each layer lying perpendicular to the other, then the hot gases roaring through the gaps between the bricks would leave patterns on both faces of the brick. By placing a second layer of bricks exactly on the top of the previous row, every brick will have at least one face that wasn't exposed directly to the hot gases, and will not have burn marks.

Table 1 shows a variety of methods of firing bricks. All have their advantages and disadvantages. Our typical down-time brickmaker will probably only have experience with clamps, scoves, Scotch kilns, and Dutch kilns. The brick clamp is by far the oldest and most rudimentary method of firing bricks. When "scoved" (that is, plastered on the outside for greater efficiency), they become scove clamps or kilns. If the clamp is enclosed within four permanent walls, it becomes a rectangular Scotch kiln. Dutch kilns are simple up-draft kilns and are a development of the kilns used by the Greeks and Romans. All of these "kilns," plus down-draft kilns, are what are called *intermittent kilns*, where fires are set and then die. In *continuous kilns* the fire never goes out. Either the fire is continually moving, or the brick is moved through a fire zone.

Down-time brickmakers have not adopted continuous kilns because their intermittent kilns have proved entirely satisfactory. In addition to their ability to do the job, they are easy and cheap to construct. The problems facing the down-time brickmaker are related to the volume of bricks being produced and the cost of transport. Firstly, the average brickmaker will not be producing sufficient volume of bricks to justify pursuing improved kiln designs. Then there is the effective limit of about four hundred bricks per wagon which, when combined with the poor excuses for

rural roads, means that the cost of transporting bricks more than four miles by road renders them an uneconomic option for construction. It follows that brickmakers will not invest in fancy permanent kilns when they may have to abandon them every time they move to stay close to their market. Add the seasonal nature of brickmaking and you begin see why brickmakers might choose not to invest in expensive structures that will sit idle for much of the year.

If the brickmaker isn't already doing it, the first thing up-timers might recommend is that a roof be constructed to protect the kiln from the weather. Drafts or rain hitting the kiln exterior will cool down the kiln, increasing the amount of fuel required to fire the bricks. A roof will also protect firewood placed on top of the kiln where it can be warmed and dried.

The choice of fuel for firing will be the first major contribution up-timers can make. Down-timers are currently using charcoal, wood, grain husks, sawdust, and even, especially in the case of the Dutch, peat. In Thuringia, at least, there is a problem with the firewood supply. There is no way brickmakers would be able to fire significant volumes of bricks year round using wood or charcoal. There just isn't enough unallocated wood available to satisfy the demand when every thousand bricks requires something like a cord of dry wood (the equivalent of about half a ton of bituminous coal). Up-timers can immediately introduce the idea of using coal and gas for firing, and in the longer term, they can introduce oil firing.

The next advance will be the introduction of new, more efficient kiln designs. The first new design is likely to be a variant of a down-draft kiln design, where the hot air and gases are pulled down and around the mass of bricks. This means the hot gases are in contact with the bricks for longer than in an up-draft kiln. Clamps and up-draft kilns are usually hottest at the bottom, meaning those bricks set lowest are exposed to higher temperatures than higher set bricks. This results in lower bricks being over fired while higher bricks can be under fired. The down-draft kiln reduces the differential with most bricks exposed to the same temperature, ensuring a better average quality product and lower failure rates. Down-draft kilns are also inherently more efficient than up-draft kilns and so it is easier to develop a more efficient down-draft kiln than it is to improve the efficiency of up-draft kilns.

As the USE starts producing more and more bricks, one of the most important objectives will be reducing the amount of fuel required to fire the bricks. Table 1 shows a selection of kilns and it also gives a range of coal consumption to fire one thousand bricks. Our levels of efficiency are likely to be low, as it has taken up-time brickmakers years to develop the materials and technology to achieve the levels of efficiency they now experience. The USE will be forced to introduce continuous kilns if they want to economically produce brick in high volumes.

All continuous kilns gain most of their efficiency gains by making the maximum use of the heat generated. They function a little like heat exchanges. Green brick enters the system through the exhaust from the fire. By careful management of the design of the kiln the green brick meets the fire zone being completely dried out and heated to over eight hundred degrees centigrade. With a desired firing temperature of about a thousand to twelve hundred degrees centigrade the brickmaker only needs to consume enough fuel to boost the temperature of these bricks another two to four hundred degrees. This results in a considerable reduction in fuel consumption compared with intermittent kilns. At the other end of the kiln, cold air is drawn in through the hot bricks. This cools the bricks at the same time it heats the air. This means that fresh hot air is fed into the fire. The fire doesn't have to heat the air, so less fuel is consumed.

4a) Kilns: Some advantages and disadvantages

i & ii) Clamps, Scoves, and Scotch kilns

These kilns are easy to build and require little investment to construct. Having (except for the Scotch kiln) no permanent structure, they can be built close to the supply of clay and fuel, so that transport costs are kept to a minimum. In a time of war the brickmaker can afford to abandon his brick yard, which will be little more than a bit of level ground with a heap of dug clay. Clamps and scoves can be made to any desired size, from a few thousand bricks right up to a million. They are ideal for small teams, as once lit they require little attention, because all the fuel was included before the fire was started.

Of course there are problems with these kilns. The Colonial Williamsburg website talks about as many as half of the bricks being fired in their clamp being either over or under fired. This is probably the extreme failure rate, but it does point out a major problem with clamps. Not only are they among the most inefficient methods of firing bricks, they are also produce the worst quality brick. There is little that can be done to change this state of affairs, as the brickmaker has no control over the firing once it has started.

This style of kiln is known to down-timers. It is only suitable for making low quality bricks because the average firing temperature only passes seven hundred degrees centigrade in the better constructed versions. It should only be used for brickmaking when you need bricks in a hurry and aren't too concerned with the quality of the bricks.

iii) Up-draft kilns

Up-draft kilns are old technology. We know they were used by the Greeks and Romans, and currently (1630s) they are being used by the Dutch (hence Dutch kilns) to make bricks. They are a simple permanent design that has a much lower capacity than the clamp, but offers some control over the firing process. Because heat is introduced to the bottom and passes through the brick mass to an opening, these kilns are usually hottest at the bottom. This uneven distribution of heat is responsible for most of the twelve percent of bricks that are over or under fired. The average firing temperature of an up-draft kiln is about nine hundred degrees centigrade. However, at its hottest point, closest to the fire, it can be hot enough to fire firebricks. By carefully choosing what bricks to put where, a skilled brickmaker can take advantage of the peculiarities of the up-draft kiln to produce a range of bricks.

The up-draft and the Scotch kiln are probably the most common designs in use in the seventeenth century. This design has been used for centuries to fire ceramics, meaning that they can be used for something other than bricks. There are a number of improvements possible for the up-draft design, such as multiple chamber designs, but they are mainly targeted at the ceramics market rather than the manufacture of bricks.

iv) Down Draft Kilns

The previous kiln designs all tend to lack permanent roofs. The up-draft kiln is dependent on its roof to function properly. The roof curve causes the hot gases to curl back into the mass being fired. The hot gases are then drawn through the mass being fired, escaping to the chimney through flues in the floor of the kiln. Because the fire is not in direct contact with the mass, and the air mixes as it curls back from the roof, there are few over- or under-fired bricks produced in a down-draft kiln. Down-draft kilns are typically more expensive to construct than up-draft kilns because the roof needs to be carefully constructed with a curve. They make up for the increased cost by being intrinsically a more efficient design which is easier to fire to high temperatures. A good down-draft kiln can be fired to over twelve hundred degrees centigrade, with some capable of firing at porcelain temperatures (thirteen hundred degrees centigrade and higher). Because the down-draft kiln can be fired to higher temperatures, the quality of the bricks produced will be

higher than in up-draft kilns. They can also be used to fire any clay based product.

A close cousin to the down-draft kiln is the cross-draft kiln. Instead of having flues under the floor, the flue opening is opposite the fire, and placed low in the wall. Again the hot gases circulate in the chamber, and are then drawn across the bricks and through the flue. Although not as efficient as the down-draft kiln, the cross-draft is cheaper to construct, and is still more efficient than the up-draft kiln. It is also an easier design in which to introduce *shuttles* (more on shuttles later).

The down-draft kiln is likely to be new to down-timers. However, it is a common design for modern potters. If there are any up-time potters they will know about down- and cross-draft kilns, and probably have reference material on how to design and build them.

v) Bull's Trench

The Bull's Trench kiln is a variant of the Hoffmann kiln (more on the Hoffmann kiln later). Designed by British engineer, W. Bull, in about 1887, this archless version of the Hoffmann kiln is widely used in Pakistan, India, Bangladesh and Myanmar, but is little known elsewhere. Its greatest advantage is its low cost of construction and comparatively low energy consumption compared to the local clamps and intermittent designs. The secret of the Bull's Trench lies in the fact that, instead of having a massive structure, the kiln is dug into the ground.

The Bull's Trench will be unknown to down-timers, and probably unknown to most if not all up-timers. The only people who might know about the Bull's Trench design are likely to be people who have worked in Pakistan, India, Bangladesh or Myanmar. The Bull's Trench kiln is unlikely to be used in Germany. The Bull's Trench design requires dry ground, otherwise you expend heat energy drying out the ground. Also, any rainfall can flood the trench.

vi) Tunnel Kiln

The tunnel kiln is a special version of the continuous kiln arrangement. Whereas in the Hoffmann design the fire moves while the bricks remain stationary, in the tunnel kiln the fire zone remains stationary while the bricks move through the fire zone. This offers a major advantage over the Hoffmann design. Instead of having multiple chambers that heat up and cool down as the fire passes through them, the tunnel kiln has only one area that is continually exposed to the same temperature. This means no extreme changes of temperature anywhere in the kiln. There are savings, as only the fire zone has to be faced with expensive firebricks capable of withstanding the high temperatures of firing. There is a downside, and that is the bricks have to be carried on trolleys. Trolleys are a useful method of moving bricks and offer savings in handling costs. However, the person running a tunnel kiln needs sufficient trolleys to completely fill their tunnel (anything from one hundred to three hundred feet of tunnel), and have some outside the kiln being loaded or unloaded.

Although most modern tunnel kilns are built on the flat, and usually within a much larger structure that shelters the kiln and the loading and unloading areas, a low-tech version of the kiln is possible. By having the structure built on a slope, the tunnel itself acts as a chimney, causing a natural draft to pass up through the tunnel. Meanwhile, gravity can be used to feed trolleys of green bricks down the kiln.

The tunnel kiln will be unknown to down-timers. There should be some reference to the tunnel kiln in most good encyclopedias, probably enough for people to know what the concept involves. Additionally, up-timers are more likely to know of the tunnel kiln than the Hoffmann kiln. This is because the tunnel kiln is a more popular kiln design in America than in Europe. The cheap energy in America made it more desirable for manufacturers than the more efficient but

more labor intensive Hoffmann design. The tunnel kiln will be considered for use down-time; however, there is still the problem with all those trolleys. Also, labor is still cheap in Germany, while energy is expensive. The reasons why the Hoffmann design dominated European brickmaking will continue to hold.

vii) Hoffmann Kiln

The first continuous kiln was invented in Germany in 1857 by F. E. Hoffmann. The Hoffmann kiln is basically a ring of down- or cross-draft kilns. It has all the advantages of the down-draft kiln with the added benefit of using waste heat to dry and heat the bricks before they are fired. Fuel consumption in a Hoffmann kiln can be half that of a normal intermittent kiln for the same mass of brick. The problem is the size of the structure. A Hoffmann kiln tends to be a massive structure that absorbs a lot of heat as the firing zone moves forward through the cold kiln. This is compensated by the fact that some of the residual heat in the kiln and fired bricks is used to preheat the air for combustion.

Any books on kilns, even articles in encyclopedias, are likely to talk about the Hoffmann kiln. For this reason it is reasonable to assume that the Hoffmann kiln will be known to up-timers. In fact, unless there is good reason to suppose someone in the Ring of Fire area has information for the Vertical Stack Brick Kiln, the Hoffmann design or some variant of it (say four chambers connected in a square pattern) is the most likely continuous kiln to be built.

viii) The Vertical Stack Brick Kiln (VSBK)

The VSBK is quite simply a vertical tunnel kiln. It has the advantage of a stationary fire zone, the advantage of a vertical chimney creating a natural draft from the bottom to the top, and the advantage of counter flow heat exchanging. Toss in the facts that for its capacity it has a very small footprint, fuel consumption is about half the next best design, and emissions are lower than most other kilns, and you have the ideal kiln for making bricks in 1630s Germany. If we then add that it is a design uniquely suited to using the German wet coal, it becomes almost a must have design.

Developed in China during the Cultural Revolution (1960s), there are thousands of VSBKs in rural China. In more recent years Chinese engineers have been introducing the technology to their neighbors. Since the start of the 1990s VSBKs have been built with Chinese assistance in Pakistan, India, Bangladesh, Nepal, Vietnam, and probably other countries. The VSBK is cheap and easy to build, and can be built in six weeks using mostly down-time materials and labor. The single up-time contribution, assuming down-timers can't make sufficiently strong ones, is a screw jack per shaft capable of lifting a five-meter stack of bricks (up to thirty tons). Even the amount of information needed to build the VSBK is small, with a group in Nicaragua building a single shaft VSBK based only on information gained from the Internet. Production in the kiln is up to about seven thousand bricks per day per shaft, and VSBKs with as many as six shafts have been built. They can't compete on volume with the bigger Bull's Trench and Hoffmann kilns, however they are significantly more economical to run, and they have significantly fewer failures. Because the fuel is added to the green bricks the fuel undergoes the same drying and warming process as the bricks. This is what makes the VSBK so suitable for firing using the wet coal to be found in Germany. Other kiln designs introduce the fuel directly into the fire zone. They need dry fuel, otherwise heat will be wasted to dry and heat the coal. Meanwhile, the VSBK uses waste heat to achieve the same result. No other kiln design is going to be as economical to fire using the wet coals.

There is of course a downside to the VSBK. As they have to be able to withstand being

stacked five meters high in the firing shaft, good quality green bricks are a necessity. Green bricks have to be lifted (or wheeled up a ramp) to the top of the tower, and then carefully placed in the top of the stack. The big problem is the twenty-four hours a day, seven days a week running of the kiln. Whereas all the other kilns need little more than monitoring of the fire during the night hours, the VSBK needs to have batches loaded and unloaded at regular intervals. Ideally, batches of bricks are removed from the bottom of the stack every sixty to ninety minutes, although in practice three to four batches are often removed at one time. This means, that for continuous operation, a source of light for the night shift is required. In a multishaft VSBK the workers can be busy right through their shift unloading from the bottom and reloading at the top.

The number of batches and the time of unloading are decided by the fire master, who uses his experience to judge when bricks are ready by the color and position of the firing zone in the shaft. This means that the fire master needs to be a skilled individual for the production of good quality bricks. The cost of poor skills in the few areas needing them can be seen in the failure rates in different countries. China has about two percent failures, India, where Chinese engineers ensured the staff was properly trained, have about a five-percent failure rate. Pakistan, where the Chinese engineers left without giving proper training, the failure rate is about twelve percent, about the same as that of the much cheaper to build Bull's Trench.

It is unlikely that anyone in the Ring of Fire has ever worked on a VSBK. It is also doubtful that anyone in the area has anything, photographs, drawings, or even downloads from the Internet, on the VSBK. There is a limited possibility that someone might have seen a VSBK in operation in Asia or Nicaragua. However, as the design concept is so simple, I think that if someone has ever walked over a VSBK and seen one in operation, that person will have sufficient information for skilled up- and down-timers to develop a design.

4b) Shuttles and kiln productivity

Having decided on the design of our kiln, what else can we do to improve productivity? One area is reducing turn-around time. In most kilns bricks are hand set, and also removed by hand. This means that both the kiln chamber and the bricks must be sufficiently cool for humans to work. However, economics rears its ugly head once again. Every degree the kiln cools is another degree the brickmaker has to expend fuel to recover. This means workers will be sent into the chamber to unload as soon as the conditions are bearable. Then we have brick setters working in confined spaces with poor illumination as they race to empty the fired batch and reload the chamber as quickly as possible. There is a way around the problem however. We can use *shuttles* or *trolleys*. A shuttle is a cart with a metal frame and metal wheels, and decked with brick, often firebrick. Green brick is set on a waiting shuttle outside the kiln. When a batch of bricks is finished being fired and cooled to a safe temperature (such that it won't crack when exposed directly to normal air temperature) it is simply wheeled out, and the new batch wheeled back in its place. Not only can setting and unloading be done in the open and relative cool, but the kiln is out of service for a much shorter period of time and doesn't lose as much heat. By using shuttles, handling of green and fired brick and the associated costs can be reduced considerably.

Shuttles can not be used in clamps, scoves, Scotch kilns or most up-draft kilns. Either the uncontrolled nature of the firing or the fact that the fire must pass up through the brick means they are not suitable techniques. Down-draft kilns (and their close cousin, the cross-draft kiln) can use shuttles. The Bull's Trench kiln, because of the hole-in-the-ground nature of the design, is not suitable for using shuttles, besides, the open air nature of the loading and unloading removes many of the benefits available. The tunnel kiln, of course, needs shuttles to carry the bricks through the tunnel. The VSBK does actually have a place for the shuttle, although its shuttle

doesn't need to be decked with brick. The VSBK is unloaded by lifting the loading deck of a trolley up to the bottom of the stack of bricks using a screw jack. Once in contact with the stack of bricks the steel poles holding the mass of bricks are removed and the trolley is slowly lowered until the next specially arranged layer of bricks appears. The steel bars are once again threaded through the gaps in the rows of bricks and the trolley is slowly lowered until the poles once again rest on a pair of heavy steel girders on either edge of the shaft. With the weight of the shaft of bricks taken on the girders, the trolley is lowered to the ground and wheeled out.

Conclusion

Unless they are prepared to spend a lot of time and resources to develop the knowledge base, up-timers will need down-timers to provide the detailed knowledge of clay and firing if they want bricks. Up-timer technology and knowledge would help down-timers increase brick production, but a simple increase in demand for brick will be sufficient motivation for down-timers to develop improvements. Put bluntly, we need down-timers; they don't need us.

Who in Grantville will have the knowledge that will help the great step forward in brick production? We know there are going to be people in the Ring of Fire area who are potters or ceramic artists. For a start, on the grid of up-timers, we have Garth Freeman and his wife Melba Sue. They have "... a very elaborate ceramics and pottery setup." This is sufficient to suggest they have at least one kiln, and some clay preparation machinery, such as a pug mill. This being West Virginia, they probably built both the kiln and the pug mill themselves. This suggests that they have books and magazines describing kilns, ceramics, and machines for preparing clay. Also, Grantville is set in an area of West Virginia were ceramics were manufactured. There is good clay inside the Ring of Fire, maybe even China clay (suitable for porcelain), for this reason Garth and Melba Sue won't be the only people in the Ring of Fire area who are into ceramics.

The small hobby ceramic artists and potters can get the industry started, but when it comes to the heavy extrusion machinery, specialist books will be desirable. This brings us to the late George Bowers. George died in about 1945, however his legacy survived through his daughters until June 2000, when his accumulated collection was auctioned off. George is important to us because he made his fortune from the manufacture of ceramics (mainly bathroom porcelain). The earths around Grantville can be assumed to be similar to those around Mannington where George made his fortune. It is reasonable to assume that, although George's massive collection of books (some twenty thousand volumes on a range of topics) does not exist in Grantville, someone in Grantville is likely to have some of the same turn of the century ceramics books and treatise on brickmaking that George might have had.

Overall the prospects for the Grantville brickmaker are favorable. If they can find a down-time master brickmaker to do the hard work of selecting the clay and judging the firing of the bricks, there is sufficient knowledge within Grantville to rapidly increase the supply of bricks. Even without the advantage of reference material, the brick extruder should be developed. Knowing bricks were made with an extruder will be sufficient to set inventive minds on the right track. The idea of using shuttles should be obvious, as nobody really likes double handling of goods when they don't have to. It is in the design of kilns where Grantville will have to be lucky. With all those chambers that have to be built to take high temperatures, the full Hoffmann kiln is going to be expensive to build. Either someone is going to have to suggest making a smaller version of the Hoffmann (say, four chambers set in a square), or someone is going to have to know about the tunnel kiln, or better yet the VSBK. The Tunnel kiln is likely to be thought of,

but it is going to be expensive to make all those trolleys. Also, it is less efficient than an equivalent capacity Hoffmann kiln. I still like the VSBK because it is cheap to build and run; also it can easily be constructed with down-time resources. All it needs is someone to have seen one in operation, or to have done a little research on them for some reason.

Glossary:

Burnt: Bricks are burnt or fired in a kiln. It doesn't mean they have anything wrong with them.

Clot: A clot of clay is a tempered lump of clay that is thrown into a brick mold. Ideally a thrown clot of clay will just fill the mold.

Continuous kiln: A kiln where the fire is kept going. The fire may move through the kiln complex, or remain stationary letting the bricks pass through the fire zone, but the fire never goes out.

Earth(s): The technical term used to refer to soils as opposed to rocks.

Extruded brick: When clay is forced through the end of a pug mill in the form of a continuous block which is then cut into small slices using wire cutters, those slices are called extruded brick. The size and shape of the nozzle defines the shape of the block extruded and thus the shape of the brick.

Fired: Bricks are fired, as in, exposed to the heat of the fire. See also "burnt."

Fire zone: Where ever the fire is burning in a continuous kiln. The fire zone can move from chamber to chamber or stay in one place.

Frog: Another name for the "kick."

Green brick: Brick that has been molded to shape, but has not yet been fired. With the addition of a little water, and a little hard work, plasticity can be restored to the clay in a green brick.

Grog: Take a broken previously fired brick or other piece of ceramic, grind it up, and use it as a filler. Grog does not regain plasticity and will not undergo chemical change when re-fired. Grog is useful for padding out supplies of expensive clay, or when the available clay needs certain additives.

Hack: To closely stack drying bricks edge on top of edge. Usually the stacks are arranged with about a finger-width distance between them. They are then left to dry a little longer. A hacking ground is an area where bricks are hacked (stacked).

Intermittent kilns: Kilns where the fire is lit anew for the firing of each separate batch.

Kick: The insert in a brick mold that causes a depression or hollow to be formed in the top of a brick. Often the brickmaker will have his name, or his company's name set into the kick. The kick helps force thrown clay into the bottom corners of the mold.

Mellowed: Made pliable and plastic, usually by tempering.

Pallet: A board sufficiently large enough to hold a single brick with space left over. For a 9" x 4.5" x 3" the pallet would be something like 12" x 8".

Plastic: This describes the condition of properly tempered clay. It can be easily worked (shaped and reshaped). If left alone it will hold its shape sufficiently long

to be fired.

Setting: The careful stacking of bricks within a kiln so that they will be properly fired.

Strike: Basically a piece of wood with a straight edge that is used to smooth off any excess clay from the top of the mold

Tempering: The art of making clay plastic and pliable by breaking it down so that water is in contact with every molecule of clay.

References:

Daniel Rhodes (1968). Kilns: Design, Construction, and Operations.

As the title suggests, a book telling the ceramics worker the history of kilns, how to design a kiln, build it, and run it. The book also provides plans for a selection of small ceramics kiln. Almost a must have for the Grantville home ceramic artist.

Edward Dobson (1903) (11th ed.). A Rudimentary Treatise on the Manufacture of Bricks and Tiles Containing an Outline of the Principles of Brickmaking.

This book examines brickmaking in England. It provides good descriptions of the process and also includes illustrations of many of machines for tempering clay and extruding bricks and sewer pipe.

Charles Thomas Davis (1895) (3rd ed.). A Practical Treatise on the Manufacture of Bricks, Tiles, and Terra Cotta:

This book describes the industry in America. It fully covers brickmaking, the machines that can be used, and many of the kilns.

Alfred B. Searle (1924) (2nd ed.). Refractory Materials: Their Manufacture and Uses.

Searle examines the refractory industry in England and Wales. There is a lot of information on where to find the various fireclays, and how to mix them for desired refractories.

Colonial Williamsburg Brickyard: Eighteenth Century Brickmaking in the USA.

<http://www.history.org/Almanack/life/trades/tradebri.cfm>

Vertical Stack Brick Kilns (VSBK)

<http://www.gtz.de/basin/gate/vertical.htm>

<http://www.vsbkindia.com/>

The Vertical Shaft Brick Kiln (VSBK) In Nicaragua

<http://solstice.crest.org/discussiongroups/resources/stoves/Martirena/THE%20VSBK%20IN%20NICARAGUA.htm>

An article on a group constructing a VSBK in Nicaragua using only the information they can find on the internet and in a few pamphlets. There are a few good photographs of the VSBK being built.

Brick Clamps

<http://www.gtz.de/basin/gate/brickclamps.htm>

Hoffmann Kiln

<http://www.gtz.de/basin/gate/HoffmannKilns.htm>
Bull's Trench Kiln
<http://www.gtz.de/basin/gate/bull.htm>
Clay Preparation
<http://www.gtz.de/basin/gate/tb11/clayprep.zip>
Clay Drying
<http://www.gtz.de/basin/gate/tb12/claydrying.zip>
Clay Firing
<http://www.gtz.de/basin/gate/tb13/clayfiring.zip>
Clay Molding
<http://www.gtz.de/basin/gate/tb15/ClayMoulding.ZIP>
Lots of other interesting documents on brickmaking.
<http://www.gtz.de/basin/publications/wall.htm>
A history of Isle of Wight Brickmaking
<http://freespace.virgin.net/roger.hewitt/iwias/bricks.htm>

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 <http://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 <http://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 <http://www.1632.org>. Look on the right for the link to "Virginia's Uptimer 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.