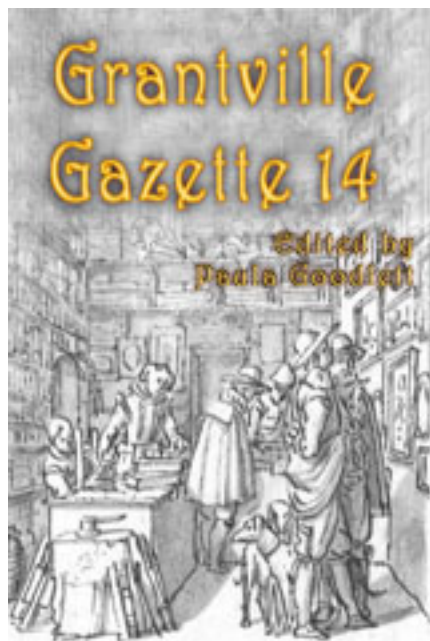


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# What is this? About the Grantville Gazette

## Written by Grantville Gazette Staff

The *Grantville Gazette* originated as a by-product of the ongoing and very active discussions which take place concerning the 1632 universe Eric Flint created in the novels *1632*, *1633* and *1634: The Galileo Affair* (the latter two books co-authored by David Weber and Andrew Dennis, respectively). This discussion is centered in three of the conferences in [Baen's Bar](#), the discussion area of [Baen Books' web site](#). The conferences are entitled "1632 Slush," "1632 Slush Comments" and "1632 Tech Manual." They have been in operation for almost seven years now, during which time nearly two hundred thousand posts have been made by hundreds of participants.

Soon enough, the discussion began generating so-called "fanfic," stories written in the setting by fans of the series. A number of those were good enough to be published professionally. And, indeed, a number of them were—as part of the anthology *Ring of Fire*, which was published by Baen Books in January, 2004. (*Ring of Fire* also includes stories written by established authors such as Eric Flint himself, as well as David Weber, Mercedes Lackey, Dave Freer, K.D. Wentworth and S.L. Viehl.)

The decision to publish the *Ring of Fire* anthology triggered the writing of still more fanfic, even after submissions to the anthology were closed. *Ring of Fire* has been selling quite well since it came out, and a second anthology similar to it is scheduled to be published late in 2007. It will also contain stories written by new writers, as well as professionals. But, in the meantime . . . the fanfic kept getting written, and people kept nudging Eric—well, pestering Eric—to give them feedback on their stories.

Hence . . . the *Grantville Gazette*. Once he realized how many stories were being written—a number of them of publishable quality—he raised with Jim Baen the idea of producing an online magazine which would pay for fiction and nonfiction articles set in the 1632 universe and would be sold through [Baen Books' Websubscriptions](#) service. Jim was willing to try it, to see what happened.

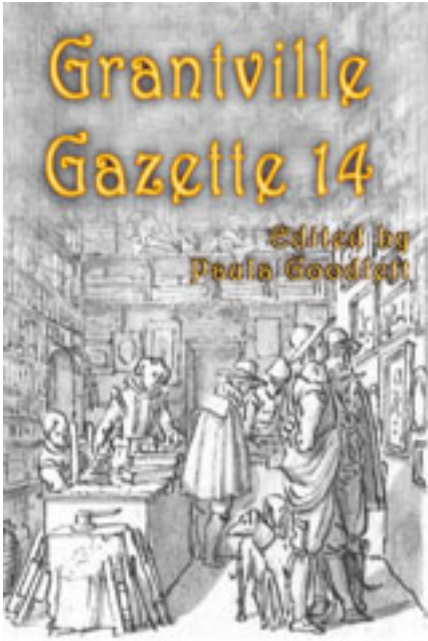
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Second: This on-line version you're reading. The site here at <http://www.grantvillegazette.com> is the electronic version of an ARC, an advance readers copy where you can read the issues as we assemble them. There are stories posted here which won't be coming out in the magazine for more than a year. How will it work out? Will we be able to continue at this rate? Well, we don't know. That's up to the readers. But we'll be here, continuing the saga, the soap opera, the drama and the comedy just as long as people are willing to read them.  
— The *Grantville Gazette* Staff

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# The Anaconda Project, Episode Three

## Written by Eric Flint Chapter 3

Fortunately, they were hungry—or James might have spent half an hour instead of three minutes making wisecracks about Lord and Lady Roth and the way they bid fair to make pikers out of any European aristocrats barring maybe the odd emperor here and there. He didn't even make one wisecrack about the food being kosher.

Of course, he might not have noticed anyway. But Melissa did, and after the meal was over she gave Morris a little smile.

"I see even you can bend a little. Smart move, if you ask me."

Morris was back to being defensive. "I didn't eat pork in the old days, even if I never had any use for most of those silly kashrut rules. Here . . ."



His wife gave him a mildly exasperated look. "To start with," she said, "we didn't really have any choice. Things are changing in Prague, but there's still no chance of Jews, even very rich ones, getting Christian servants. And even if you could, you couldn't trust them not to be spies working for somebody else. So all the servants in the house, including the cooks, are Jewish—and the only way they know how to cook is kosher."

She shrugged. "So, I persuaded Morris that it just made sense to make a virtue out of the business. You know how Jews are, Melissa, even if"—she gave Nichols a skeptical glance—"James is probably awash in goofy notions. Most of Prague's Jews, and certainly all of the rabbis, know that Morris' theological opinions are radically different from theirs. But Jews don't care much about theology, the way Christians do. They care a lot more about whether people maintain Jewish customs and traditions and rituals. And since we now do—"

"Not all of the customs," said Morris, half-snarling. "I was born Reform, raised Reform, and I'll damn well die Reform. No way I'll ever start meals with a prayer thanking God for not making me a woman. Not to mention—"

"Husband, quit it," snapped Judith. "We follow most of them, and you know it perfectly well. And you also know that between that and the fact that all of Bohemia's Jews depend on you to keep them in Wallenstein's good graces, everybody is being friendly to us. Even the rabbis, most of them."

She gave Morris an accusing glare. "And don't pretend otherwise! You even *like* some of those rabbis."

"Well . . ."

"Admit it!"

"Fine. Yes, I like Mordecai and Isaac. But they're—they're—"

He made a vague motion with his hand. "Not exactly just orthodox rabbis. It's more complicated. More . . ."

"Many-sided?" asked Melissa. "Full of potential, not just limits?"

Seeing her triumphant look, he scowled. Then, transferred the scowl to the servant Rifka when she entered the dining room.

Timidly, seeing her employer's expression, she drew back a pace.



"Oh, stop it, Morris!" snapped Judith. "He's not glaring at you, Rifka. He's just glaring the way he always does when one of his pet prejudices develops legs and starts walking around on its own instead of obeying his orders."

She added a winning smile to settle the young woman's nerves. "What do you need?"

"Ah . . . nothing, Lady Judith. It's just that some people have arrived and insist on speaking to you immediately."

"And that's another thing I miss," muttered Morris. "Doorbells, so you'd know when somebody was at the blasted door."

"House this size," James muttered back, "you'd need a foghorn."

Judith ignored both of them. "Please, show the visitors in. We've finished eating anyway."

\* \* \*

When the newcomers entered the room, Morris' expression darkened still further. Melissa's, on the other hand, was full of good cheer.

"Well, I do declare. Red Sybolt, in the flesh. We were just talking about you, as it happens. Or rather, I was. Morris was trying to evade the subject."

"What subject?" asked Red. "But, first, some introductions." He gestured to the four men who'd come in behind him.

"You know this big fellow, of course." Pleasantly, the very large man standing just behind him nodded at the people at the table. That was Jan Billek, one of the central figures of the Unity of Brethren, the theologically-radical church led by Bishop Comenius which, in another universe, would be driven into

exile and eventually become the Moravian church in America.

Red's hand indicated the two men standing to his left. "And these are Krzysztof Opalinski and Jakub Zaborowsky. My kind of guys, even if they're both Polish szlachta. Finally—"

He clasped the shoulder of the last man, a burly fellow wearing a rather exotic-looking costume, and pulled him forward. "And this here's Dmytro Fedorovych."

Sybolt grinned cheerfully. "He's a Cossack, of all things. Well, sorta. They're not exactly Cossacks yet, you know. He tracked me down while I was in Lublin with Jan here, doing nothing we need to discuss at the moment. He heard I was connected to the Prince of the Jews in Prague, and insisted I take him there and make the introductions. That's you, Morris, if you didn't know."

Morris was practically ogling Fedorovych. The fact was, for all his belligerent talk on the subject, the Jewish jeweler had been born and raised in America. Melissa didn't think he'd ever actually met a Cossack in his life.

"Oh, my," said Judith. She indicated the many empty chairs surrounding the huge table in the dining room. "Please, gentlemen, have a seat."

Morris kept staring at Fedorovych. Wondering, apparently, if the savage Cossack even knew what a chair was in the first place. Melissa almost laughed.

As it happened, despite the rather outlandish outfit—she thought it was probably derived from Tatar or Mongol apparel—Fedorovych took his seat quite gracefully.

"And to what do we owe the pleasure of this visit?" Melissa asked them.

"What do you think?" said Red. "Word's out that Wallenstein appointed Morris to grab half of eastern Europe for him—"

"*Already?*" demanded Morris. "Dammit, who blabbed?"



"Could have been Wallenstein himself," said Red. "It's a tossup whether he's shrewder than he is vainglorious. Relax, willya? When I said 'the word was out,' I only meant in selected circles. Mostly

Jewish circles. The most likely culprit for the leak is you, actually. Or rather, the servants who overheard you talking about it. They'd have passed the word into the Prague ghetto and from there . . ."

He smiled. "In case you hadn't figured it out already, what with you being the Prince of the Jews, all the Jewish settlements in the towns of eastern Europe are connected to each other. The point being, the word's out, and these gents want to dicker with you."

He turned toward the very handsome young Pole named Krzysztof Opalinski. "You can start the dickering with these two. The reason they know about it is because I'd already gotten to know them while engaged in that business we don't need to discuss, and I told them myself."

"We don't care about Wallenstein's aims on the Ruthenian lands," said Opalinski. He gestured to his partner. "Jakub even less than I do, being as he is from the area himself."

Jakub Zaborowsky had a twisted smile on his face. "My family's szlachta like Krzysztof's, true enough. But his family is prominent and well-off and we are dirt-poor, as Red would put it." The term "dirt-poor" came in English, easily blended into the German they were all speaking. "I think we'd do better off back in Poland, if the situation was changed. The only ones who do well in Lesser Poland are the magnates, even if most of the szlachta there try to console themselves with the sure knowledge that they are of noble blood while they spend their days dealing with hogs and money-lenders like any peasant does. Mind you, I have no great belief you could ever get those ignorant Ruthenians to do anything but drink themselves into a stupor, but so be it. They'd be Bohemia's problem, not ours."

Opalinski spoke again. "So we will not contest that issue with you. Indeed, you will have our blessing, even to a degree our active support. Strip away their Ruthenian estates, and half the magnates who have Poland and Lithuania under their yoke will lose most of their wealth and influence."

For the first time, he came into focus in Melissa's mind. The easy and effortless way he said "under their yoke" was the tip-off. In Melissa's experience—which had been quite extensive in her youth—the only people who could whip out phrases like that as naturally as most people talked of the weather, were dyed-in-the-wool radicals.

"And who, exactly, is 'you'?" she asked.

The handsome young Pole sat erect, looking stiffly proud. "We are members of the newly-formed Spartacus League of the Republic of Poland and Lithuania."

His partner Jakub, who seemed either less full of himself or simply blessed with a good sense of humor, smiled ironically. "We took the name from Rosa Luxemburg's revolutionary organization. She was a Pole, you know, and a Jewess. Even if the history books mostly talk about her in Germany."

James Nichols rubbed his face. "I swear, no virus or bacillus who ever lived is as contagious a vector as those fucking books in Grantville."

Melissa smiled back at Zaborowsky. "Out of idle curiosity, which unlikely tomes did you find in Grantville that said anything about Rosa Luxemburg and the Spartacus League. I wouldn't have thought the public library—much less the high school's!—would have carried any such books."

Both Poles looked at Red. For his part—very unusual, this was—the UMWA man looked almost embarrassed.

"Well . . ."

After a moment, Melissa's jaw sagged. "You swiped them! From *my* library."

"Oh, jeez, Melissa, I don't think loaded terms like 'swiped' are called for here. What the hell, you were

locked up in the Tower of London for a whole year. Not as if you'd miss them any, until I got them copied and put them back."

Melissa glared at him. Then, glared at Nichols.

"Ease up, dear," he said mildly. "I didn't give him permission to come into our house and take the books. First I even knew about it."

The gaze he gave Red was every bit as mild as his tone of voice. "Odd, though. I never imagined you had second-story burglar skills."

"Me? Oh, hell no." Red was back to his normal cheery self, the momentary embarrassment having vanished like the dew. "But I know some guys who do."

To Melissa, he said: "And since you asked, the three books in question were a biography of Luxemburg, a collection of her writings, and a history of the German Social Democratic party." He coughed into his fist. "Among others, of course. I gotta tell you, for someone like me, you got far and away the most useful library in Grantville. Anywhere in this here world."

"You could have asked!"

"You were locked up in the Tower, like I said," he replied reasonably. He gave James a glance. "And since I figured he was likely to get stubborn about it, you not being around to say yes or no for yourself, and since he wasn't hardly ever in the house anyway what with spending every waking hour at the hospital, I figured it was just simpler all the way around to borrow them for a while until I could get copies made."

Melissa didn't know whether to swear at him or laugh. In the end, she did both. "You lousy fucking commie!" she exclaimed, gurgling a little.

He shrugged. "I prefer the term 'revolutionary socialist,' myself, although I certainly won't squawk at 'Bolshie.' But fair's fair. From now on, Melissa, you can borrow anything of mine without so much as a by-your-leave. What's mine is yours, as they say."

"You don't own anything, Red," said James, in that same mild tone of voice. "Except the clothes on your back, which wouldn't fit Melissa anyway."

"Well, of course not. What kind of agitator goes around hauling lots of trunks and suitcases with him? I got exactly what fits into a reasonable sized valise. Still. The principle's the same."

Melissa had never found it possible to stay mad at Red Sybolt for more than a few seconds. First, because he was such an incorrigible sprite. Second, because she was something of a kindred spirit. She'd admit it was a little silly for her to be denouncing Sybolt as a commie, seeing as how she could remember the label being applied to her often enough.

"Fine," she said. "Bygones be bygones, and all that. But I'd still like to know"—here she looked at the two Poles—"what exactly in the writings of a socialist dealing with late nineteenth and early twentieth century Europe, the two of you find all that relevant when it comes to the political situation in Poland and Lithuania in the year 1634."

They practically gaped at her. Belatedly, she realized how silly the question was. True enough, Luxemburg's stature with regard to Marxist economic theory was neither here nor there, in the here and now. But there was so much *else* in her life and writings.

For a moment, she contemplated all those "elses." Complete disdain for nationalism. Contempt in particular for touchy exclusivism, including Jewish particularism. An equally complete commitment to

social equality in all spheres of life. In her own way, Luxemburg had been one of the great feminists, too. And she'd never flinched from revolution, whatever else. Despite her well-known differences with the Bolsheviks, she'd been one of the few leaders of the German Social Democracy who had immediately supported the October Revolution.

Melissa peered at the two young men at the table, who were peering back at her. Belatedly, also, remembering her earlier pronouncement—intended more as a jest than anything else, really—that Poland produced revolutionaries and radicals as readily and easily as it produced grain.

She'd always found the Poles an exasperating people, in the course of her long study of history. Brilliant, one moment; incredibly pig-headed and self-centered, in the next. Always prone to explaining away their own history as the fault of everyone in the world except they themselves—yet, just as ready to lend a hand in someone's else righteous fight. Pulaski was only one of many. Every time Melissa had found herself, in those studies, on the verge of deciding the Poles were simply history's designated basket case, she'd remind herself that the same nation produced the fourth largest army to fight the Nazis in World War II.

Naturally, they'd done it *a la Pole*. Their nation's regular army had been hopelessly outclassed when the Germans invaded and overran Poland in 1939. They'd been defeated in five weeks. Thereafter, however, the Polish government in exile put together a Polish exile army, air force and navy that constituted a much more powerful force than the better-known Free French managed to do, despite Poland having a smaller population than France.

She wondered how it would all turn out in *this* universe.

"Nevvvvvvvvvvvvvvver miiiiiiiiiiiiiiiiiiiiind," she said, in English.

She saw that the Cossack was squinting at her in puzzlement, and realized that her Roseanne Roseannadanna imitation would have been gibberish to him. From the intent expression on his face since he'd arrived, for that matter, she was pretty sure his grasp of German wasn't all that good, either.

"And what's Mr. Fedorovych's angle in all this?" she asked.

"Well, it's complicated," said Red. "And we'll have to have Jakub do the translating for us. Dmytro's German is lousy and my Ruthenian—which is actually about a jillion dialects—is even worse."

Everyone looked at the Poles. Jakub began speaking to Fedorovych. After a while, the Cossack started speaking.

The first sentences translated were:

"He says he thinks—so do many people he's spoken to among the Zaporozhian Host—that they'd do better if they shifted their allegiance to Wallenstein. They're fed up with the Lithuanian and Polish boyars, and they don't trust the Russians at all. But first, he says, Mr. Roth has to agree to do something about the Jews."

"I knew it," hissed Morris. He scowled at the Cossack. "I suppose he expects me—God knows how I'd do it even if I were so inclined—to make all the Jews living in eastern Europe just somehow vanish. Stuff somewhere between a hundred and two hundred thousand kikes into my kike pocket, I guess."

Zaborowsky translated. Frowning—he seemed more puzzled than anything else, from what Melissa could tell—Fedorovych shook his head and spoke. The translation came back:

"He doesn't understand why you think to move the Jews. It's impossible anyway, because there are far too many of them. Besides, they make lots of useful things. But he says they have to stay in their towns,

or, if they move into the countryside, they have to do it like any other farmer. No more working for the boyars."

Morris stared at him. Then, glared at Melissa. "This is *your* fault."

"Huh?"

His wife looked exasperated. "Morris, that's absolutely childish!"

He slumped back in his chair. "Yeah, I know it is. It's still her fault. I can remember her causing trouble since practically the first day she showed up in Grantville, way back almost forty years ago."

Melissa sniffed. "That is why I came here, after all. At *your* insistence."

"Don't remind me." Morris wiped his face. "I feel like I got somehow dropped into the set of *Lord of the Rings* right at the point when Tolkien conjured up an alliance with dwarves and elves." Gloomily: "And what's worse, some idiot cast me as Gandalf."

\* \* \*



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# Jenny and the King's Men

Written by Mark Huston

*And thus a mighty deed was done by Jenny's valiant hand,  
Black Prelacy and Popery she drove from Scottish land;  
King Charles he was a shuffling knave, priest Laud a meddling fool,  
But Jenny was a woman wise, who beat them with a stool!*



The column of soldiers advanced down High Street from Edinburgh castle. They parted the market-day crowd like a trout swimming upstream. Young boys ran up and down the column of soldiers, reveling in the novelty of having a troop of King Charles' men marching through their market.

Ahead of the boys flew the rumors. By the time the squad of soldiers and their officer reached the corner of St. Giles Street and High Street, where the greengrocers and fishmongers were selling their wares in the shadow of St. Giles Cathedral, the rumors had raced ahead of them like wildfire.

Jenny Geddes, the greengrocer in the second stand from the end, had one eye on the soldiers and the other on the vegetables in her cart. When there was a distraction in the street, someone, usually one of the street urchins, would dart up and try to run off with a carrot or two. Not today. She had been doing this for over twenty years, taking the stand over from her father when he died. And if her two daughters were lucky, maybe one of them could do the same.

The officer bellowed out his halt order, and the soldiers stopped in front of the cathedral.

Jenny took a moment and sucked on her pipe, put her hand on her hip and glared at the soldiers. *Ever since Charles*, she thought, *that dirty papist-leaning king with a Catholic wife, arrested a whole lot of young lords over talk of a rebellion, things have been unsettled.*

But there was nothing that required this sort of armed display down the middle of High Street. She

shook her head at the nonsense, and went back to keeping one eye on her stand and one eye on the troops in the street. *Besides, that mess was over weeks ago; they were past this sort of thing. Bad for business, it is.*

The troops stopped at the other end of the square, and she could hear the murmur of the crowd around them. She grabbed her little three-legged stool and stood on it to get a better view, still keeping one eye on the cart. She thought she heard her name and raised her hand to shield her eyes from the glare of the sun. She shifted her pipe to the other side of her mouth. It fit well on both sides, as she had teeth missing on the right and left. She squinted against the sunlight with her not-so-perfect thirty-five-year-old eyes, and listened again.

"They be a looking fer Jenny?" someone said. "Jenny Geddes?"

"What on earth has she done?" said another.

An old man spit on the ground. "These are t'king's men. Why would they be looking for Jenny Geddes? That makes not a wit o' sense."

Heads and eyes began to swivel toward Jenny. She stepped off the stool as inconspicuously as possible, and knocked the fire out of her pipe on the heel of her shoe. The pipe went into her pocket. She could see the soldiers advancing through the crowd to her left and to her right. They were surrounding her. She had a decision to make. Stay or flee. In all of her years in Edinburgh, she had never seen anyone who was arrested in this manner live to tell the tale. She thought of her daughters, her small plots of land outside the city gates, and made her decision. It was a simple and practical decision. There would be certain torture or death in the hands of the king's men. She had done nothing wrong—at least nothing wrong enough to send more than the sheriff after her. Whatever the reason that they were coming for her—guilty, innocent, mistaken identity—it was a sure thing that no good would come of it.

Flee.

She'd had a talent for evading pursuit since she was a girl. The twists and turns and dead ends of the medieval streets of Edinburgh were a playground to her as a child. She knew she could evade them, but then what?

Jenny scooped up the few coins she had made this morning, moved back from the oncoming soldiers, and headed for the church courtyard directly behind her. There was a small passage that led to Candlemaker's way, and then to Cowpath Street. She took Cowpath Street into town every morning at dawn. It was one of the few streets on the south side of the town that had its own gate, one of only a handful into the walled city. She'd make for that gate.

Troops were hollering for her to stop, and she sprinted to a narrow opening in the corner of the courtyard. She wasn't quite as skinny as she had been as a girl, but she still fit. Her tattered clothing caught on the bricks, but she kept moving.

The opening became a long passageway between two buildings, with just enough room to slip sideways between them. The bright sunlight abruptly changed to shadow as she shuffled sideways into the musty passageway. It smelled of urine. She tried not to think about what was happening to her shoes.

She glanced behind her and could see the soldiers gathering at the opening. She kept shuffling as fast as she could.



"Where does this come out?" growled the officer. "You four stay here, you two follow her in the passage, the rest of you come with me."

She glanced back again, and saw two men begin to squeeze into the passage. She knew her pursuers would have to work their way back through the dense market-day crowd still clustered in the church courtyard. They would then have to backtrack up the hill to another street that cut through, and then race back. By then, she should be long gone.

"If I wasn't so afraid, this would almost be funny," she muttered when she popped out of the passageway a moment later. Her pair of pursuers had gotten stuck.

"Cowpath Road is where I need t'be," she thought. "If I can get there, I'll go home and get the bairns, and then I'll. . . ." The thought trailed off as she continued to walk quickly through the maze of the city. Then what? She had no savings, no money, and no immediate family. Since her husband had died five years ago, she had been just holding on. There was some help from the church, but charity always irritated her. "One thing at a time, Jenny me girl, one thing at a time."

The terrain turned dramatically downhill as she continued to slip between buildings, and she knew she was close to the road. Just a few more yards and she would be in view of the gate. She slowed to a walk and caught her breath. Soldiers were nowhere in sight, far behind and limited to the streets.

"Attract no attention to yerself, lass" she thought, "just walk around this corner and be calm. Say g'day just like always."

She peered out from around the corner, looking straight at Cowgate. She took a moment and looked carefully. Everything seemed normal. She waited, and watched. She was about to step around the corner when a young woman carrying a basket approached the gate to leave the city. As the girl reached the open gate, soldiers appeared from outside the gate. With their swords drawn.

"Well, now. That's a bit odd." Jenny kept watching. The soldiers questioned the girl, inspecting her basket carefully. They then started leering, and grabbed at her. She complained and pulled away. McNulty, the regular gatekeeper and toll collector, stepped in and spoke to the men. McNulty was over fifty years old, and in no shape to take on two soldiers. But his commanding demeanor, roughly honed by three decades at Cowgate, convinced the men to let the girl through the gate without further molestation. He continued to talk to them after she had gone on her way. He then began to talk very animatedly to the men, who responded in kind. The argument continued. McNulty was one of the few honest gatekeepers in the city, and he had known Jenny all of her life. He was the gatekeeper when her father had his stand.

Jenny leaned back against the wall, out of sight of the gate and tried to think. Were they searching for her at the gate? She had to find out before she tried to go through. She frantically tried to think of a way to find out what was going on; how could she get home without being discovered?

"Dear Lord Jesus, please give me a way t'git home wi' me bairns," she whispered softly with her hands folded. "Take me if ye needs, but leave them be, please." She would need to act quickly; the other soldiers would be coming soon.

She heard footsteps approach from the direction of the gate. She eased further away from the street and pressed against the building. She watched McNulty pass on his way up the street. He was muttering to himself, still upset from his encounter with the soldiers.

Jenny took a sharp breath as he walked past her, and made another quick decision. "Oy. McNulty. It's me, Jenny Geddes. What be happening? Are they looking for me?"

McNulty stopped suddenly, and did not respond. He casually eased toward the corner where Jenny was hiding, and leaned his back to the wall facing the street. He did not look at her. He looked up and down the street, and then spoke quietly over his shoulder. "Jenny Geddes, wa' in Gods name did ye do, lass? They got the king's men out after ye. I ain't seen the likes of this fer many a year." He paused and pulled his cap down lower on his face. "Aye, they be looking fer ye. They got orders to kill ye. W'a di' ye do, lass?"

"Nothing. I swear it on my mother's grave, McNulty. Ye knows me, knows I go t'kirk always. I don't cheat folks. I am a god-fearing woman and I have a business. I didn't do nothing." She paused to think. "I don't like the papists, ye know that. But who does?"

"Then why are they looking fer ye, lass?"

Finally the frustration welled up in her, as the adrenaline melted away. She began to cry. "I swear that I hae done nothing! I just want to get back to me bairns and hug 'em and make sure they are well." She sniffed, and regained control. No time to cry. "I hae got to get home, McNulty. Wa' cannae do?"

"They will be a waiting fer ye at home, Jenny. You got to hide. All the gates be manned like this one, with English soldiers. You got to hide."

"But me bairns . . ." The tears welled up again.

"Have you heard of the 'Committees of Correspondence'?"

"Aye." She sniffed. "The ones with the speeches and the place on Little's Close" She sniffed again.

"Go there. Ask for the German. His name is Otto. He will be able to help ye. I will send word through him about the bairns. Go and stay outta sight. If they catch you, they will kill you. That much I do know from these lads at me gate. Ye may want to hide until it's dark; there will be just a sliver of moon tonight. I will find out about the bairns." He glanced toward the gate. "Get away from here. The bloody English lads at the gate are starting to notice me here. So git."

"There will be more soldiers coming soon. They will be looking fer me."

"Lord, girl. What could they want with you? Now git on w'ye, before they get suspicious."

"God bless ye, McNulty."

"Git, woman!"

\* \* \*

Otto Artmann sat in the back room of the tiny CoC building in near perfect darkness and listened. He could hear the rats moving in the dark alley behind. Most of Edinburgh had gone home for the night. Soldiers had stopped patrolling the streets looking for Jenny.

Carefully, so as not to make any noise, he shifted positions in his chair. He had been sitting for two hours, waiting, and his leg was falling asleep. He had caught a bad pike wound in his calf while fighting in the Germanies four years ago. After his capture by the Americans, he was released into a new world. A world he was determined to make better. He had spent a lot of his life making the world worse. He pushed the old thoughts out of his head, and focused on listening again. He was rewarded with a new sound. Silence. The rats had stopped moving in the alley. Silently, as he rose from the chair, he slid his dagger out of the sheath in his boot, and moved to the back door. It was so quiet that he could hear someone breathing and the movement of fabric from behind the door.

"Otto? Are ye there? Otto?" The voice was low, quiet, tense.

He paused before answering. "Aye. Who is this? Who sent you?"

"McNulty. I'm Jenny. Jenny Geddes."

"I'm going to open the door. Jenny, please step forward and I'll close it behind you."

"Aye."

Still in darkness, he opened the door and allowed the person to walk in. "Step in and stop."

The dim light that came in from the alley gave him a silhouette, nothing more, but he thought she fit the description.

She whispered, "Are you Otto? You sound German."

"I'm Otto," he said and closed the door. "Wait and I'll uncover a candle."

He looked at her when he uncovered the candle. Her face was plain, he decided. Worn, tired. She had a large frame for a Scot, tall, sturdy. Her nose had been broken once or twice. She was dirty from her ordeal and her clothing was soiled and dank. When she smiled back at him, he could see that she was missing teeth. He had lost a few teeth over the years himself, so who was he to judge?

"I'm a bit of boggin, I am." She looked away. "Thank ye. I'm no' used to charity, an I don't know if I kin repay ye the kindness." She straightened, as if realizing what she said, and looked him in the face. "I'm no' a girl who would be repaying ye wit, well, ye knows." She looked down at her body and smoothed her dirty dress. "I don't do that, nere will. Ye ken that?"

"I understand, Jenny. I don't expect anything in return, at least not now. And when I do, it will not be that sort of thing. Do you want something to drink or eat?"

"Aye. Both please."

Otto handed her a mug of beer, turned and began to prepare her food. "What do you know of the Committees, Jenny?"

"No' a lot. Ye just do braw for people. Guilds nae like ye. Ye have something to with the strange people from Germany. S'posed to be from the future. That's all."

"The Americans."

"Aye, them the ones." She paused and looked up at him. "What de ye hear 'bout me bairns? Are they safe? Do ye know? I ha' been worried to death. I dunno what I'd do if something happened—"

"They are safe with some people who are with the Committee. The soldiers came to your home looking for you, and the girls hid. We found them later in the afternoon when they went to the Dunnes. They are safe."

He watched as she bowed her head, and prayed a quiet thanks. She looked up at him. "The Dunnes be good people. When can I see them?"

"We need to get you safe first. Do you have any idea why they are trying to hurt you?"

"No. I have been thinking on that all night; I cannae come up with an answer. I don't know what I have done. Ye think they have me mixed with another Jenny of some sort?"

"We don't know. But we are trying to find out. We think the order may have come from London. The timing is right. You were wise to run away when you did. Damn that King Charles."

"I not like words like that if it's not in the kirk." She grinned mischievously. "But I did run, didn't I?" She smiled again. Otto liked the way her face lit up when it smiled, even with the missing teeth.

"Your food is ready. It's not warm, I don't want to risk a cooking fire and draw attention to us. This room has no windows, and we fixed it so there is no danger of someone seeing the light from the candle."

"I see." She bowed her head and offered a short prayer over the food, and then she wolfed the small meal down.

"We don't understand what is happening, Jenny. But something tells me that you're part of it. Or will be in the future. We'll have to find out which part you play. Or will play. You can stay upstairs here, and out of sight till tomorrow. Then we will move you to a safe house, and possibly out of the city in a few days when things settle down a little."

"And me bairns?"

"After we move you, we will get you together with your children."

She nodded and smiled. As he watched, he saw the energy drain out of her. The tension of not knowing about her children must have been a huge strain. *And now that she knows they are safe, she probably wants to sleep.* He picked up the candle.

"Take this, Jenny. There's a loft above this room; the ladder is over there. There is some clean bedding; we will get you some clean clothes tomorrow. And don't worry, I will be down here all night."

He watched her slowly climb the ladder to the loft. When the candle went out, he sat back down in his chair and listened for the rats to return outside.

\* \* \*

"What do you mean, they failed to capture her?" John Lauder was not a happy man, and his high-pitched

voice squeaked higher than usual. He coughed to bring it under control. "I wanted her head, dammit." Lieutenant William Hignall shifted his weight from foot to foot. He was clearly uncomfortable. Lauder liked him to be uncomfortable. "Sir, the troop and I did exactly as ye requested. We thought we had her trapped in the churchyard during the market, but she escaped down a passageway we couldn't follow." "Is she still in the city?" "We don't know for sure." Lauder shot his best glare at the man, and watched him with satisfaction as he carefully considered the rest of his answer. "But . . . we believe she is. Her children have also disappeared. She is hiding somewhere—" "You have a keen grasp of the obvious for one in your position, Lieutenant," snapped Lauder. Hignall inhaled, exhaled, and tried to relax. "Sir, she is probably in one of the tenements somewhere in town. She has no family to speak of, although she is well thought of with the lower class of people in the city. She sits at church as a placeholder on the Sabbath for some of the more devout families. I am certain we will find her."



Lauder stood up. "That is what I am paying you and your men for, Lieutenant. To find her. If she is hiding, then let it be known that there is a reward." He crossed his arms and looked coldly at the Lieutenant. "This reward is an investment for me, Hignall. A substantial investment, in my future. Go now and do your duty as I have requested. In the king's name, of course."

Lauder watched as the Lieutenant retreated through the door of his study. He smiled. John Lauder knew something that not many men could say. He knew the future. He repeated it to himself. The phrase seemed so unnatural.

He knew what had happened to him in that other future, and he was going to improve it. In his old future, he had achieved one of the goals of his life. Peerage. Nobility.

He was a merchant. Wildly successful, and rich. Richer than most of the so-called nobility. He huffed at the irony. He was a commoner, who could buy and sell many of them.

In that other future, he achieved only the lowest ranks of nobility. He smiled coldly as he looked at the papers in front of him. The conclusion to be drawn from them was obvious, even if it was not written as such. During the war with Scotland, which now might not be fought, he had supported King Charles. That much was clear. He was rewarded with lands taken from those who opposed the king. Which

increased his vast fortune even further. He was given the opportunity to buy a baronetcy, the lowest of the ranks of the noble class.

This time, it would be far more than a baronet of Nova Scotia. Far more. *Lord* Lauder had a very nice ring to it, he decided. And taking the head of Jenny Geddes was one step along that road.

The king would be pleased.

He rubbed his hands together, placed them on his skinny hips, and called to his servants for lunch.

\* \* \*

Jenny was not a happy person, nor was her seven-year-old daughter who stood in front of her. The girl, Dolina, was on the verge of tears, and was holding her butt where it had just been swatted.

"I told ye you couldn't go outside. It's not safe for us here. I been worried sick about ye. Where ye been, girl? Tell me now."

Dolina's lip quivered. "Just playing, Mum."

"And where is your sis, Elspeth? She's supposed t'be watching ye."

"Elspeth's playing too, Mum."

"Where is she, then?"

"In the alley, Mum. Couple houses over."

"Sit down there, and stay. Do you understand me, lassie? So help me, I'll tan your hide if ye do this again."

"Yes, Mum." The lower lip continued to quiver.

Jenny went to the front door, and opened it a crack. Otto had been explicit in his instructions. Do not go outside, not for anything. Stay away from the windows. She had fallen asleep for just a moment and Elspeth, who was ten and should have known better, slipped away. Jenny was going to tan her hide when she got her back. She peered out the slightly open door, and looked up and down the street. There was nobody in sight. The street was a small one, no more than a dead-end alleyway, with three-story town houses on either side of the narrow way. The homes were run down and gritty looking, and the street was filthy with garbage, both human and otherwise. The strong odor of it struck her nose. She crept out and quietly closed the door behind her.

Jenny knew that Otto would be back soon, and she wanted to get Elspeth back into the safe house before he returned. Otto had gone to the market to buy something so she could prepare the evening meal. She glanced up and down the deserted street again. Nobody seemed to be out, so she headed down the street toward the end. From there she could see a small gangway between two houses and could hear children's voices from behind the house. She walked quickly and quietly down the alleyway, and stopped before she rounded the corner behind the dwelling. The area was a typical hodge-podge of crumbling and propped-up buildings. Behind two of the buildings, there was a junk-strewn open area. Something was probably there years ago, but she guessed that it had burned down.

She listened at the end of the alleyway, until she could hear Elspeth's voice. She glanced behind her once again, and seeing nobody, she peered around the corner. She could see the girls playing on a trash pile, using sticks for dolls and burned wood for their doll cribs. There were three girls, along with Elspeth, all of them between ten and twelve years old, she figured. She could see no one else in the alley. She stepped out and called quietly to her daughter.



"Elspeth. Elspeth. Oy, girl. Come here."

Elspeth looked up and saw her mother. Jenny could see the emotions flowing across her face. She could tell that the first thought was momentary confusion. The second was the realization of where she was, third the realization that she was in trouble, and the fourth thought, Jenny saw, was her daughter looking for her little sister, who was nowhere in sight. Elspeth turned and looked at her mother with panic in her eyes. Jenny stepped further around the corner and waved to the girl to come to her.

She saw Elspeth glance at her new friends, then back at her mother. Elspeth said goodbye and hustled toward her. As she ran up, she began with the excuses. "Mum, I am sorry, I lost track of Dolina. She can't have gone far, Mum. She was right here a second ago, and when you was sleeping, I thought that it would be all right to go out and play. I heard the girls outside and—"

All of this came out in a rush of apology, fear, anxiety, and the terrible understanding that she had made a big mistake. She braced for a slap. Instead, Jenny shushed her. "It's all right, Elspeth. Be quiet. Now."

Jenny looked around the back alley to see if there was anyone there except for the other children. She saw nobody else. She sighed with relief. She knelt in front of her older daughter, and looked at her face. It was flushed with embarrassment. She whispered to her. "Lassie, did ye tell anyone your name?"

Elspeth looked at her mother with fear. "Umm. Sort of. I told them I was Elspeth, and that I usually live outside the walls, and that we were staying down the street. I didn't see the harm in it, Mum, they are just kids like me." As the girl finished the sentence, her eyes went beyond her mother and focused on someone else. Her eyes then flicked back to her mother, and she swallowed. Jenny tensed at her daughter's reaction. Someone was coming up behind her. She quickly stood up, turned around, and pushed her daughter behind her, facing whoever was coming down the alleyway.

They were two large men, who were dressed as if they were bricklayers, dirty and dusty from a day at work. She tried to control her fear, but her face must have given her away. She watched as they became suspicious, reacting to her fear. The two men looked at each other, and then turned back to her. The

older one spoke.

"Who might you be?"

"We are just a visiting, down the street a bit." Jenny smiled at them, hoping to charm the burly bricklayers.

The younger man called to the other girls in the alleyway. "Alice, Mary. Get ye home, and be quick about it. Now!" The girls ran off, looking back at Elspeth as they went by. One of them waved. The younger man took a half-hearted and somewhat playful kick at the last one, and landed it on her rump. Jenny and Elspeth both smiled at him, and he smiled back. The younger one took a step forward, as if to introduce himself. The older man held him back.

"Just a moment, Andrew. I asked this lady a question, and she hasn't answered me yet."

Andrew looked confused, and turned to the older man. "Da, she is just a new lass from down the street. We're not the papist inquisition, fer heaven's sake." He turned to Jenny and smiled. "My name is Andrew, and this is me da, Bill. We live up there on the third floor, and my sister's kids and my daughter live below. Nice to meet you."

Jenny was still holding Elspeth behind her. She smiled and curtsied. "'Tis nice to meet you, Andrew. You too, Bill." She grabbed Elspeth's hand. "I am afraid it's time for us to be heading back home—"

"Not so fast. What did ye say your name was?"

Andrew once again looked at his father in surprise. "Da—"

"Quiet, boy. I am asking a question. Now what did ye say your name was, lass?"

"I don't believe that I have said it, kind sir. Now if you will excuse me, we need to be getting home . . ." Jenny grabbed her daughter by the hand and tried to work her way past the men in the narrow passage. The older man put his arm out against the wall and blocked her way.

"Da—"

"Quiet, boy!" he bellowed. Andrew backed away, and Jenny flinched at the power in his voice. "Your sister said there was two girls playing out here with the kiddies. And now here is the mum. Think, boy. What was every one talking about at the brickyard today?"

Andrew looked perplexed. "I dunno, Da. What was it?"

"If I said, 'reward money,' would that ring a bell?"

"Oy. D'ye think this is her?" Andrew asked.

Jenny couldn't help the stammer. She was never very good at lying. "Oh, I'm not that woman, the one they are after. Oh, no. That be someone else. My name is Mary. Yes. Mary, that's it. Mary Dunne. So we will be getting along now, kind sirs . . ."

Bill looked at Elspeth. He took a small step and loomed over her. "What be your name, now, lassie?"

Jenny felt her daughter's hand tighten in hers.

"I . . . It is . . . Els- I mean, Mary. It be Mary, too, sir." Jenny squeezed her hand back.

Bill unexpectedly reached out with his calloused hand and clamped onto Jenny's wrist. She winced in pain. Andrew stepped back again, away from his father. "Da, do you think this is her?"

Bill looked at his son, and then back at Jenny. He held her arm up. "She not be crying out now, is she, boy? I would think if she wanted to be rescued, she would cry out now, don't ye?"

Andrew smiled. "Where are we supposed to take her for the reward? Lord, Da. The reward. We'll be rich!"

"Aye, boy." Bill turned around and started. Otto Artman was calmly standing in the narrow alleyway, arms folded, leaning against the wall.

Otto's voice was quiet and even, and with his German accent, it sounded all the more menacing. "This lady is under the protection of the Committee of Correspondence for Edinburgh. Nobody is going to turn anyone in for reward. Let her be." He smiled. "Please."

Jenny could see Bill and his son exchange a glance, measuring up the man in front of them. He was armed with a sword; they had no weapons. But together they were three times his size.

Bill smiled at Otto. "Four years of work is what it might take me, if I was lucky, to make that reward money. Neither you or your committee scare me." With no more than a flick of his wrist, he pushed Jenny aside and back down the alley. She heard Otto's blade come out of its scabbard.

She yelled. "No! Otto, don't hurt them." The two bricklayers stopped and glanced at her in surprise. When they turned back to Otto, they were looking at his blade held level at their throats. He was faster than they ever thought possible. Jenny, too, blinked at the speed. She knew he was a soldier at one time, that was obvious, but she had no idea. . . .

Otto looked at them grimly. "It is not the policy of the Committee to cut men down like dogs in the street. Someday, maybe, but not now. Not today."

"Otto, they have children and live in this building," Jenny said.

Otto looked at her and smiled faintly. He stepped back very slightly and addressed the father and son. "If you were to collect any reward, you would not live to profit from it." He stepped forward, and pushed his blade closer to their necks, one at a time. "Do you understand what that means?"

Andrew and Bill looked at each other. Andrew quickly shook his head at Bill, and Bill nodded back. They turned to Otto. "Aye, sir."

Otto took a step back. "The CoC takes care of their own, gentlemen. There are more besides me who would make sure there would be no profit in it."

Andrew and Bill nodded again. "Aye, sir."

Otto motioned Jenny to move behind him. He smiled broadly at the two bricklayers, stepped back again, and sheathed his blade. "I invite you to stop by the CoC building. We are just off the Mile, up from St. Giles High Kirk. We can always use help, especially when the help is the size of you two. There is much you could do." His smile went wider, and he bowed slightly.

As Jenny looked back over her shoulder, she saw the two men still standing in the alleyway. She waved at them, and after a moment's hesitation, they waved back. And smiled.

\* \* \*

"Otto, ye haven't told me where we are goin'?"

"We are almost there, Jenny."

"These new shoes hurt my feet. And I feel like some sort of a fancy bird in these clothes."

"Almost there."

"Ave you ever tried walking in new shoes the first time? It's murder till they get broke in. There was a man I knew that all he did was walk around in rich people's new shoes so they would be broken in when they wore them for the first time. He was a cousin to the shoemaker over in Harper Lane. I used to think, 'that would be a life, why he's got it made, he does.' But hiking over the cobblestones and the shite in the street in new shoes is not the easiest job in the world."

Otto smiled at her with that strange smile of his. He spoke quietly so nobody in the street could overhear him. "Jenny Geddes, you are the only woman I ever met who would complain about new clothes and shoes."

She leaned toward him to whisper. "I ain't complaining about the clothes and the shoes. Not at all. I'm complaining about having to walk across the whole of Edinburgh city in new shoes. That's all."

When he first gave the shoes and dress to her, she was confused by what she thought was a gift, and an expensive one at that. He explained to her that it was a disguise.

She was still not sure what to make of this taciturn German. Jenny had spent most of her life being practical. Nothing more. Her mind put any other thoughts completely away. "One thing is for certain. Nobody will recognize me in this, even if I was behind me own cart in the market."

"Aye, Jenny. You do clean up rather well."

She laughed and turned to look at her daughters, who were following. They too, had been given "new" used clothes by Otto. Both girls were dressed in something nicer than they had ever hoped to wear in their lives. She looked at the happy expressions on their faces and felt guilty. Guilty that she could never have provided for them in this way. As a greengrocer and a widow, she lived precariously. It was not that much different an existence than most of the city, granted. But as a mother, she had always hoped for something better for her children.

While they continued to walk, she went over the last few days in her mind. Chased by soldiers, finding Otto and the Committee of Correspondence, nearly being caught for the reward money, and the tedium of hiding in the house for several days. And now, here she was, dressed in finery as a disguise, hiking across town to places unknown. She shook her head. Strange times indeed. Her practical mind told her that she shouldn't get used to the finery, because that was going to change. She didn't know when or how. But she knew it was true. She sighed and trudged on.

"Here we are."

She looked up and felt her jaw drop in amazement. "Is this the house where we be going?"

"Yes."

"By the front door, not the back door?"

"Yes."

"Oy. You're sure?"

He mounted the three steps to the heavy oaken front door and knocked. "Quite sure."

There had been no change of neighborhood to get to where the rich people lived. Edinburgh was so crammed together that everyone lived on top of one another. The members of the privy council, judges, lawyers and clerks lived alongside tenements and the shops of candle makers and smiths. The door opened, revealing a large man dressed as a servant. Jenny knew just by looking at the fellow that this was not your typical servant. He looked like he should be on a battlefield, not an Edinburgh townhouse, and a new house at that.

The large servant spoke. "Hello, Otto."

"Thomas. Good to see you again. I believe we have an appointment with Robert and his visitors?"

"Please come in; be seated in the library. I will let them know that you are here. Right this way." He led them down a hall and into a large room. There were more books there than Jenny had ever seen in her life. She was good with figures. She counted at a glance maybe twenty-five bound books, along with

another dozen or so unbound ones. She turned to the children. "If either of you touch anything, I will swat your arses all the way back across town. Do ye hear me?"

Elsbeth looked as overwhelmed as Jenny felt. She nodded. "Yes, Mum." She nudged her sister who was looking at a cabinet of curiosities standing in the corner. The cabinet had one of the most interesting dolls they had ever seen, with silky blonde hair, and fancy clothes, and funny pointed shoes with a tall thin heel.

"Don't touch a thing," Jenny reminded them. She turned to Otto. "Will you now tell me where we are? And how do you know these people?"

"Jenny, you are impatient sometimes, do you know that?"

"Aye, I can be. And you can be frustrating at times."

"I know these people from Thüringia, in Germany. That's where I met them."

"These don't look like the type of people that the Committees are interested in, Otto." She glanced over at the girls, who were staring into the cabinet. She reminded them in a stage whisper, "All the way across town, that's how far I will be tanning your little hides. No touching! Do ye hear me?"

"Yes, Mum." The girls tore their eyes off the strange doll, and put their hands in front of them.

"That's more like it."

The door opened and in walked a short man with red hair and whiskers. He was smiling through curiously good teeth. Otto recognized him instantly. "Alex! Good to see you. You are looking well."

The two men embraced briefly, and Alex turned his attention to Jenny. "So this is the famous Jenny Geddes, eh?"

Jenny could feel herself blushing. "Umm. Aye, sir, I am Jenny Geddes. I don't know about the famous part. Sir."

The man in front of her got a twinkle in his eye, and she found him instantly likeable. "Ah, but I do. Please sit down."

Otto spoke first. "How is the 'baroness,' Alex?" They laughed together. Jenny felt bewildered by the reference.

"Aye, she is fine. She is putting the baby down to nap, and will be here shortly."

Jenny leaned forward to catch Otto's eye. She raised her eyebrows, and said "A baroness?" very quietly, almost mouthing the words.

Otto smiled at her, and back at Alex. "Suppose you tell Jenny here how your wife was elevated to the Swedish nobility."

"Well, it's a long story, but basically it was due to her valor in combat." Alex smiled. Jenny decided it was an honest smile. She believed he was telling her the truth. She just didn't believe what she was hearing. The surprise must have shown on her face.

"Jenny," Otto said, "you really need to close your mouth. You look like a codfish."

She snapped her mouth shut. And immediately opened it again. "Oy! In b-battle?"

"Aye. My wife, Julie. But she didn't do nearly what you did, all on one Sunday morning."

Jenny got a little defensive. "I am at the kirk every Sunday morning. I get there early and save a place for the Dunnes, usually right in the front. I save them spots, and then I sit down on me stool, and listen to the preacher. So there's nothing I could have done in a battle or anything else on a Sunday morning. And when did I do this thing? Is that why the soldiers are after me? I swear, it never happened, whatever

it was. You got the wrong woman."

Otto said, "It is not what you did, but what you will do. Or at least would have done." He looked at Alex. "Our language needs a new tense for this. A 'future that may not happen' tense. It's not past tense, it's not future tense, so perhaps we should call it 'maybe' tense. It would make this so much easier."

Jenny cut him off. "I have no idea what you are talking about. Otto, if this is some kind of joke, then I \_\_\_"

"Wait a moment, Jenny." Otto paused. "I brought you here because you are so practical, and so hard-headed, there was no way you would believe me if I just told you. So I have to show you."

"Show me what?" This had been a difficult week for Jenny, and she decided she was no longer in mood for games.

Otto looked her in the eyes. "The future that might have happened, but didn't."

"Aye. And I'm the bloody queen of England." She crossed her arms and sat back in the chair, quite unladylike.

Alex jumped in. "What he's telling you is true, Jenny. I have never known Otto to speak aught but the truth. You can depend on that with your life." Jenny thought she saw a look pass between the men, as if recalling a specific incident.

She sighed, exasperated. "All right, what was it I was supposed to have done but didn't and still may or may not do?"

From behind her, a youthful female voice with a very strange accent answered. "You started the English Civil War. It eventually led to the beheading of King Charles."

Jenny found herself standing and looking at the woman who had answered the question. She was dressed in a most outlandish fashion, with a pullover shirt with writing on the front, which Jenny couldn't read, but it was very colorful. It was also stained with what looked like baby spittle. For an instant she thought she was meeting the wet nurse. But this girl was far too small of build for that. Slim in an athletic sort of way, like a circus performer she remembered from her childhood. Her pants, too, were outlandish. For one thing, they were *pants*, for heaven's sake. Women did not wear pants. Especially pants that showed her female figure to an advantage. Snug, like Jenny had never seen.

But it was the girl's eyes that Jenny noticed. The face was young, a little tired. Pretty in a girlish sort of way. Nice teeth. But the eyes, they were so . . . she grasped for the right word . . . wise? Experienced? They weren't old eyes, but Jenny felt that they had seen far too much in her short life, and she instantly felt her heart go out to the girl.

"Oy. King Charles' head! I did that?"

Alex rose from his chair and went to the girl. His kiss made the cloud go from her eyes, and only the girl was visible again. Jenny marveled while Alex made the introductions.

"Jenny Geddes, may I present to you Mrs. Julie MacKay, Baroness of Sweden, formerly of Grantville, West Virginia, in America, and the absolute best shot in the entire world, without compare. Julie, this is Jenny Geddes. Jenny, Julie—Julie, Jenny."

The two women stared at each other for an awkward moment, then smiled. Julie's eyes landed on Jenny's daughters, and she smiled again. "Who are these fine young ladies?"

"The older one is Elspeth, and the little one is Dolina."

"What pretty names."

"Elspeth was my mother, and my husband was Donald, so we named the little one Dolina after him."  
Dolina spoke up. "Is that your doll in the cabinet?"



Julie crouched to her level. "It used to be. But we gave it to Alex's father, Robert, as a present."

"Can I play with it?"

"I don't see why not. That's what it's for." With that, Julie opened the cabinet and gave the girls the doll. At first they were tentative, and then began to examine it closely. They really fixated on the strange shoes Jenny noticed, as she wiggled her sore feet.

Julie leaned over to Jenny conspiratorially. "That ought to keep them occupied for a while." She paused while she looked at the girls. "You have lovely children, Jenny."

"I suppose. They are a bit of all right. Strong and sturdy, they will make fine wives someday. They are old enough to do their chores, and they do them well. Elspeth is learning some letters from the Dunnes; they have a fine house up the way from us and our cottage." Jenny paused while she thought of her cottage. "I don't suppose we will ever be able to go back there again."

Julie looked sympathetically into Jenny's eyes, then took her hand and set her down on the couch.

"Jenny, I'm from the future, from the town of Grantville. Do you believe me?"

Jenny leaned back and looked at the girl again. There was just something so different about her. Jenny couldn't quite place it. A radiance, health, something subtle that she could not put a name to. She thought about what they could possibly gain by lying to her, with some elaborate ruse. But she was just Jenny Geddes, greengrocer. And they had protected her from the king's men.

She decided. "Aye. I do believe you. Not sure why. But I do."

Julie smiled warmly. "Have you heard of Grantville, and the Ring of Fire?"

"Aye, the preacher was talking to it the other day. I figure the church don't know what to do about it, but they say it is real enough. That's all I know. Is that where you got that funny accent?"

"Doesn't sound funny to me, Jenny." Julie smiled, and both women laughed nervously. "Would you like to know how you did all of this? What you did?"

Otto leaned forward. "Girls, we are going to visit with Robert for a few minutes." Jenny gave him a

"please don't leave me" look. He just smiled that odd smile of his, and patted her hand. "You're in good hands, Jenny. I'll be back in a moment. Julie will explain it all."

When the men filed out of the room, Jenny turned to Julie. "How in the world does someone like me manage to bring down that bloody papist, Charles?"

"Do you have a stool that you sit on in church?"

"Aye."

"Well, to start the war off, you threw the stool at a bishop. He was starting to read from a new liturgy that was put in place by Archbishop Laud. You are reported to have said something about 'preaching papist something or other to your lugs.'"

"Me?"

"And after that, the whole place went up for grabs, and a riot started. Then the riots spread, and the whole thing went on from there. This is supposed to happen about three years from now."

"Me?"

"It's what *that* history remembered you for."

"*That* history?"

"Well, Jenny, I say that history because it is the history I knew, in my world."

"I caused the whole thing to start? Me. Jenny Geddes, the widowed green grocer."

Julie just nodded. "It is a little hard to believe." She sighed and sat back on the couch. "Sometimes I don't think it's real myself. Before the Ring of Fire, I was a high school senior, head cheerleader, looking forward to graduation, college. And today, I'm in the seventeenth century, married to a fine man, with a new baby. That man's father, Robert, whose house this is, has a broken back, and he is dying. In my world, there was so much we could do to make him well—be able to live a full life. And we are trying to do so much . . ."

Jenny took Julie's hand, and gave it a squeeze. That odd look had come back into Julie's eyes, the one she saw a flash of when she first came into the room. Jenny tried to imagine what this girl must have gone through. She just squeezed a little harder.

They stayed like that for a moment, and Jenny began to think, trying to assimilate all that she had learned in the past few minutes. She knew it her gut it was true, and she knew that Otto was right. Without meeting Julie, she never would have believed it. A thought came to her. "Now I understand why the king's men were after me. They wanted to kill me so that I wouldn't throw my stool, and then there would be no war. That is it, isn't it?"

Julie pulled her hand back and brushed a bit of hair out of her face. "Well, no. At least we don't think so. Laud and Stafford have agreed to leave Scotland alone, so Charles can deal with all the people who overthrew him, or at least might have. But that history is not going to happen. It's impossible. So what's the point of coming after you? It makes no sense. They have agreed to leave the Scots alone. There are any number of stupid shit royals up here who helped Charles to the block, why pick on you?"

Jenny shrugged. "Heaven knows, I have no idea . . ." She paused for a moment. "Baroness?"

"Please. Call me Julie"

"Aye. Julie it shall be."

\* \* \*

Otto half-staggered and was half-carried out of the pub by three soldiers. One was a sergeant, and the

other two were regulars. He had gone to the bar with the goal of trying to find out who was behind the attempt to capture Jenny Geddes. He was leaving in a state of semi-consciousness.

Sergeant Thatcher had overheard the conversation, and could tell his men were being pumped for information by the German fellow, under cover of old warrior's tales. The German talked a big game, fighting with Tilly on the continent, Magdeburg, White Mountain. Trading stories. Garrison life must be dull, what do you men do to stay sharp? Chase greengrocer women? Who paid you to do that? How much does that sort of a job go for here? Can I buy you another beer?

It was at that point that Thatcher walked quietly up behind the man, and rapped him on the side of the head with the pommel of his sword. Not enough to kill him, certainly. Just enough to render him senseless for a while. There was a skill to hitting someone that way, and it took considerable practice over the years to get it right. As well as a few fatal and near-fatal errors. He'd gotten good at it by practicing on Irish prisoners five years ago.

They dragged him out of the pub, and waved at the concerned barkeep and the serving girls. "He's had a bit too much. We'll take care of him . . ." They dragged him toward an alley not far across the lane. There, Thatcher would find out who he was working for and report it to his Lieutenant. Should be a bonus in it for him, he figured.

"Take him over there, lads, and sit him down against the wall." Thatcher knelt before the semi-conscious Otto. "Well, well, well. What have we here? A German asking questions about a worthless green-grocer woman. I wonder why that is." He stood up, turned to his men, and smiled. "Right, lads. This is where I'm going to teach you a little about interrogation. Pay attention and learn from your sergeant." The two regulars grinned at each other expectantly.

"First, we need to wake this lad up." He squatted back down and began to slap Otto hard about the face, first one way and then the other. Otto moaned as he began to regain consciousness.

"Next, we need to make sure he is not going to go anywhere."

The first soldier spoke up. "Do you want us to tie him up so he won't run away?"

"No. Not necessary." Thatcher pulled his dagger and ran it through Otto's calf, just below the knee. Otto screamed. Thatcher twisted the dagger so he could pull it out. Otto screamed again. . "Wakes them up and keeps them from moving, it does."

The regulars nodded at the wisdom and efficiency of their sergeant. He squatted down next to Otto again.

"I know that a man such as yourself, who has been in so many illustrious battles, won't tell me anything because you are so tough." Thatcher grinned up at the two regulars. "But let me ask this. And you should answer, otherwise, I run you through on the other calf. Then your thighs, then the wrists, the arms, and finally your dick. You won't be dead. You will then tell me what I want to know, so that I kill you to stop the pain. Let's get started shall we? Who are you working for?"

"Fuck off, you shithead." The three soldiers laughed.

"Well, at least you aren't like some of those dammed Irish, begging for your life right away. There will be some sport in this, lads. Pay attention and learn from the master." All three men were smiling. The man on the ground in front of them was helpless, bleeding and holding his calf with both hands. They didn't see his right hand slipping into the top of his boot.

Sergeant Thatcher turned to smile at his two pupils. "Now, lads, the next cut will be to the opposite calf. They were just beginning to grin when Otto's dagger went deep into Thatcher's neck at the base of his

skull.

Otto left the dagger where it struck and pulled the sergeant's sword from its sheath, launching a desperate lunge at the vulnerable neck of the closest soldier before either of them could react to his savage assault. Otto's lunge caught the man through the carotid artery . Blood sprayed from the wound as the man gurgled and stumbled backwards before falling to the cobblestones.

The third soldier had his sword out. He surprised Otto by attacking immediately instead of running. Otto barely parried the lunge, and stepped back defensively. His calf gave out and he fell to the ground. He cursed his incompetence as he fell, cursed himself for not remembering the wound. He made a mental note to remember wounds—if there was ever another.

"You bloody bastard," the remaining English soldier growled. Otto lay on his back with his blade raised ineffectively.

*"Probably won't be a next time,"* thought Otto.

The soldier batted aside Otto's sword and stepped up to deliver a fatal thrust. Suddenly he froze. He looked confused, then reached behind him. His hand returned stained with blood.

Otto saw the light go from the man's still-confused eyes. Then the soldier fell.

"About goddamn time, MacKay."

"Aye, Otto, sorry. I had to piss."

"Well, hold it next time."

"How's the leg?"

"What do you think? It bloody hurts. I just hope the damage isn't too bad."

Alex surveyed the carnage in the alleyway. "After all of this, have we learned anything?"

"The soldiers in the tavern said it was some rich bastard by the name of Lauder. No idea why, just who."

\* \* \*

"And just what is a Committee of Communication?"

"The Committee of Correspondence, Mr. Lauder." Lieutenant William Hignall sighed inwardly. His bosses in the privy council had told him to give this man whatever he wanted. Hignall was trying to accommodate, but he was not happy about it. He would be respectful, polite, and try very hard not to kill the idiot where he stood. He took a breath and continued. "The people hiding Jenny Geddes are called the Committees of Correspondence. There are a couple of Germans involved, as well as many Scots. My men apparently escorted a German out of the pub last night. According to the barkeep, this man is a known organizer with the committee."

"I thought they were killed due to your men quarreling among themselves, Hignall. As competent as they seem to be, it would not surprise me at all."

Hignall bit his tongue at the clumsy sarcasm. It was either bite, or run the man through right then and there. "Sir, the fact that we can get no information from our informants in the city is also typical of the Committee's methods. They are as bad as the worst criminal gangs, sir. And they are political. They are linked to the Americans in Thuringia. We have been unable to get a spy into their inner council."

"My God, you do have the excuses, Hignall!" Lauder's sharp and thin face looked as if it were about to burst. "All I wanted was a simple arrest and killing of one greengrocer, a woman at that. And this one German, who was dragged unconscious out of the pub, is possibly part of this correspondence committee and lethal enough to kill three of your men in an alley. It is far more likely your men were

fighting over who was going to steal this German's boots, or whatever else he might have on him. Although I can't imagine anything he could have that was so valuable." The rich businessman stopped and wagged his finger, and Hignall had the briefest fantasy of snapping it off and shoving it up his ass. "This is simple incompetence, and I will have words with my friends on the privy council. You know what the council does, don't you, Hignall?"

Hignall felt his tongue bleeding in his mouth. "Yes, sir, I do. But—"

"The council is the group that advises the king on all matters regarding Scotland. They have the direct ear of the king. Most of them are my friends, Hignall. You would do well to remember that. It seems you need constant reminding."

Hignall swallowed some more blood, and replied. "Yes, sir."

"There's a limit to my patience, Hignall. Get the job done, soon. Otherwise we might embarrass the privy council, and that would be very—how should I say it?—awkward for you. So. You have two more days. Otherwise . . ." Lauder paused, and tugged on his goatee, and waved his hand. "Otherwise, there will be severe consequences for you. Do you understand?"

"Aye, sir. I understand."

"And Hignall, how many Germans do you think are in Edinburgh?"

"Can't be that many, sir. Less than a hundred maybe."

"Find that German from the pub. He should lead you to the woman."

Hignall bit his tongue even harder, if that was possible. "We are working on that now, sir. Looking for the German."

"You are? Wonderful. It seems you do have a brain, Lieutenant. You have two days. Any more than that, I will have to stop looking, and you will stop . . ." He smiled a great officious, oily and false smile. ". . . stop doing whatever it is you do."

Outside Lauder's fortified house, Hignall took the reins from his man, and they mounted the horses for the nine-mile ride back to the walls of Edinburgh. He spat the blood out of his mouth onto the ground. "This asshole wants to be a bloody damn Lord-dumbshit-royal-bastard." He spit more blood. "He don't need to work very hard at it, he already has the stupid-asshole-bitch-like-a-woman part down. He will fit right in with the rest of those pricks."

The soldier next to him nodded. "Aye, sir."

"We got to find us a German or two." Hignall spurred his mount harshly, and rode off toward the town. His man followed.

\* \* \*

Julie Mackay rapped the proper code on the door of the safe house, with Thomas, the MacKay's bodyguard servant in tow. The door opened cautiously, and then was immediately thrown open.

"Julie! This be a surprise, lass. What brings ye here? Hello, Thomas." The large man nodded. "Well, come in, come in, don't stand out there like a couple of beggars, come on in. It's not too fancy, but it's clean." She closed the door behind them after a quick glance up the empty street.

"I've come to bring you a little present, Jenny. Is there somewhere a little more private that we can talk?" Jenny looked about the small first floor, and then at the staircase.

"Up here. But mind the seventh step."

"Why the seventh step, Jenny?"



As Jenny bounded up the stairs, she pointed to the seventh step. "This one here is a stumble step. It's different than all of the other stairs, so if ye be creeping up the stairs in the dark, and ye don't know the house, you are going to stumble and fall, and wake us up."

As Julie walked up the stairs, she smiled. "Well, son of a gun. Seventeenth-century burglar alarm. You have to step up another couple inches to clear it."

"Aye. Your Otto is a clever one, Julie."

"My Otto?" Julie giggled. "I sorta thought he was your Otto." She walked into one of the larger bedrooms on the second floor.

"Very funny. I got no time for that nonsense. Men can be a pain in the arse."

Julie sat on the side of the bed and motioned for Jenny to sit down beside her. "What do you mean, Jenny? Haven't you seen the way he looks at you? And smiles? In all the time I have known Otto, I have never seen him smile that way. And it is always at you. Nobody else I've ever seen."

Jenny remained standing, and fiercely shook her head. "I ain't seen nothing of the sort. You're imagining things, you are." She popped her pipe in her mouth with a frown. "I be too long in the tooth for that sort of thing, girl. No time, no money. Men can be a pain in the arse."

"Jenny. Please sit down."

"I am fine where I am, lass."

Julie snickered a little under her breath. "You know that Otto is a very busy man. He runs what we hope

will become a real Committee in Edinburgh. Have you seen anyone else come and take care of you? Have you noticed the way he looks at you? The way he smiles? I noticed as soon as I saw him with you in Robert MacKay's home the other day. He likes you, Jenny."

"That be children's play, that is." She crossed her arms and pulled on the unlit pipe. "I ain't got the time nor the inclination for that sort of foolishness."

Julie laughed out loud. "I hear you saying it, Jenny. I'm not buying it."

"Suit yerself."

Julie grinned. "I am glad I met you, Jenny Geddes. I didn't realize how long it had been since I talked openly to another female about anything. I really needed to. We must have gone on for three hours."

Jenny cleared her throat, and put her pipe away to stall for some time. "Well, I think ye needed it too, Julie Mackay. Even if you are some sort of duchess or baroness, or whatever it is. And that little Alexi is a cutie. I'll be here for you if you need to talk, any time. Providing that the king's men finally give up on me someday."

"Do you want to see your present?"

\* \* \*

After Julie and Thomas had left, Jenny showed the present to the girls. "This tiny little thing is a revolver. It is a gun, like a great gun a cavalryman wears, so don't you girls go messing with it. It looks like a toy, but she says that it will kill a man right quick. It's a twenty-two caliber, the smallest of the guns she has. I'm going to hide it under my bed and I don't want you two touching it. Ye hear me?"

"Yes, Mum."

She didn't tell them that Julie had shown her how to use it. It was to be used up close and personal. And she was to keep pulling the trigger until it stopped firing.

\* \* \*

William Hignall knew that he had made a mistake the first time he did what that idiot Lauder had told him to do. Take the troop out and capture the woman. It didn't feel right the first time, and sure enough, it went to shite. He should have taken a small squad, just a few men, and picked her up at her home. No fancy show, just get the job done. This time, he was not going to make the same mistake. He broke the men up into three- and four-man teams, each one tracking one German or another. He took three of his better men with him, and went after any Germans that might be involved with the Committee of Correspondence. Those were the most promising leads. And one of those, a fellow named Otto, was the most likely prospect.

They tracked him, through the word of some street urchins, to a small, out of the way street that appeared to dead end. The urchins said he was there often. Hignall surveyed the short street. "We'll start on this side. Bang on the doors, break 'em down if you have to. We're looking for the German and Jenny Geddes."

The first decrepit townhouse they came to had a large family with six or seven kids living in two rooms, and another family upstairs. When the door was answered, they forced their way in, and there was a lot of screaming by children and adults.

Hignall grabbed one of the kids—she looked maybe nine or ten—and held her by the hair. His men kept the others at bay with drawn swords. "Quiet," he roared. "I am going to make this very simple. I am looking for a German, or a woman with two children. They might be on this piece of shite street. Who in here does this filth belong to?" He presented the child in front of him, still holding her by the hair, his

dagger pulled and pointing at her neck. "I want an answer now, you ignorant Scottish bitch." He raised the blade as if to strike, and a woman came screaming and sobbing out of the gaggle of ragged people. She was halted at the points of the drawn swords of his men.

The woman sobbed, pacing in front of Hignall's men like a caged animal. Agitated, but harmless, thought Hignall. Like some bitch of a dog. "She be my child, sir. What do you want to know? Please don't hurt her. I'll tell you, what you want to know." The rest of the children were cowering in the corners, and a few had run off. Hignall didn't care much where they went; it didn't matter. He was going to find out what he needed right now.

He pressed the blade to the back of the child's neck. "Answer me, woman. Is there a German living on this street?"

She glanced with apprehension over her shoulder at her other children and what looked to be her husband, then turned nervously back to Hignall. "Aye. Please sir, let her go."

"Which dwelling?" The woman hesitated, and Hignall pressed the blade tighter to the little girl's neck. She began to whimper. "Which dwelling, woman?"

"He be three doors down, sir. Clean house it is, good house, with windows in it. Please sir, let her go." "Anyone living with him?"

"He don't live there, sir, he just visits. Every day." She was struggling to be calm, fighting to stay rational. "Please, sir."

"Is there a woman and two kids living there, two girls about this one's size?" He nodded toward his hostage.

The woman dropped to her knees. "Please sir, do not harm my little girl. I beseech ye, please."

"Answer the dammed question, woman, or I will run her through in the name of the king. A woman and two children?"

"Aye sir, she be the one you are looking for. Three doors down. Please sir, I beg ye."

Hignall snapped, "You know this is the one we have been looking for? Why didn't you come forward?"

"I don't know, sir."

Hignall almost whispered. "The next time your king, through his men, tells you to do something, you *do* it, woman!" With that, he pulled back his dagger and neatly sliced off one of the girl's ears. She screamed, the mother screamed, and Hignall threw the bleeding child toward her. "You will be reminded of your duty to your king every day now. All of you."

He turned and stalked out of the room and into the street, wiping the blade of his dagger between his fingers to clean it. "Damn these Scots. They are almost as bad as the Irish." He turned to his men. "Let's get this over with. I need a drink." He sheathed his dagger and strode to the third door down, leaving the screams behind him.

"Prime your wheel locks, lads"

"Aye, sir"

"Shoot the German if he's there, and run everyone else through. We'll just take the heads, don't need the whole thing."

\* \* \*

Jenny heard the screaming from down the street, and tried to see from the window what was happening. Outlaws usually don't go into homes like that one with the screaming children, and seldom in the

daylight. Nothing there to steal. They must be searching, she thought, searching for me. She saw a couple of children run away in panic from the house, then turn with their hands on their head and start sobbing, walk a couple of paces back to the house, and run away again. Helpless in their agony and fear. Jenny bit her lip.

"Elspeth, Dolina. We are going to run out the back and through the alley. Can you find the Mackay house if we get separated?"

"Aye, Mum," replied Elspeth.

Dolina began to sniffle. "I'm scared, Mum."

"Don't be scared. Your big sister will take care of you. Listen and obey her. But you must run like the wind, my little lassies, like the wind. I need to get something from upstairs. I will be right back." As she turned and sprinted up the stairs, the first thuds of men trying to batter the door could be heard. The girls screamed.

"Run *now*!"

Jenny darted out of the bedroom with the revolver. Her hands were shaking, and she felt naked with this little weapon. The door exploded inward, and the men stormed into the room downstairs.

Jenny drew back into the bedroom as quietly as possible, looking at the small weapon in her hands. She stepped up onto a stool, looked out the tiny window, and watched the girls running, hand in hand, as fast as they could go.

\* \* \*

Hignall entered the room and stood still, listening. He saw an open door at the back of the house, and sprinted to look through the door.

"This place has a back door. These places never have goddamn back doors. Smith. Get after them kids."

"Aye sir, what about the mother?"

"Never mind her. She's still here."

"How do you know that, sir?" one of the men asked.

"Because no mother would run in front of her children. They are always behind. She's still here." Hignall looked around the two rooms that made up the first floor. He could see no cellar, only a staircase going up. He smiled, and nodded to his remaining men. "Follow me, men."

"Aye, sir."

\* \* \*

Otto Artman was bleeding from his calf as he limped at a furious pace toward the safe house. He had avoided a group of soldiers once, and he was worried. As he rounded the corner, he realized he needed to be worried. He had seriously misjudged the amount of effort Lauder was putting into finding Jenny. The first house he came to was in chaos. No time for that. He continued down the street, now leaving frequent drops of his own blood as he walked. When he saw the door to the safe house off of its hinges his heart went dark. Knowing what might be happening beyond the open doorway made him angry at a primal level. He drew his sword and dagger and charged through the open door .

He came face to face with three soldiers, one of them an officer. English regulars. The king's men. His face drew back into a snarl, and he attacked. Otto went low, hoping to score a quick hit on the officer, but the man was already poised for combat before Otto came through the doorway and easily parried Otto's thrusting sword.

"Shoot this son of a bitch." The officer called as he stepped out of the line of fire.

Wheel lock pistols came out of the belts. Otto dove blindly to the side, landing on the bottom of the stairway as one of the guns discharged. The noise was deafening, and the smoke that formed was thick and acrid.

The soldier who had fired dropped his pistol drew his sword, and charged Otto.

In Otto's mind the man was dead already. He easily parried the soldier's thrusting sword before closing to thrust his dagger into the man's belly.

The soldier dropped his sword, both hands felt for the wound in his belly. "You've killed me, you bastard!" he hissed, falling and rolling into the path of the other two men.

Otto's eyes turned to the second wheel lock. He backed up the stairs as the officer came after him. The soldier with the wheel lock followed, trying to get a clear shot from his position behind the officer on the narrow stairway. Smoke filled the air and rose up the stairway, stinging everybody's eyes.

\* \* \*

Sergeant Robert Smith felt a little foolish chasing a couple of kids with a drawn sword. They had ducked down a gangway between two buildings, and ran into an opening beyond. As he was about to round the corner, a dusty arm the size of a tree branch suddenly extended across his path. He could feel his head stay stationary, and the rest of his body move forward. He had a curious sensation in his neck. His feet swung out and he fell onto his back, breathless. As he was lying on the ground, looking up at the sky, two giants appeared. Their rock-hard hands picked him up as if he was a rag doll.

"Da," one of them said. "Don't kill him in front of the children."

Robert wanted to agree, but he found he could not speak. As a matter of fact, he noticed he was very short of breath. His limbs dangled at his side, and he couldn't move. As the giants carried him away, he heard another popping noise come from his neck, and then there was merciful blackness.

\* \* \*

Otto continued to back up the stairs, thrusting at the officer, attempting to keep the officer between him and the remaining wheel lock while also preventing the officer drawing his own pistol. They moved from side to side, always moving, going up the stairs one at a time. Otto felt the stumble stair, and stepped up. He planned his attack.

But the officer was good. He had seen the adjustment that Otto made for the stairs, despite the smoke, and cleared the step easily. He easily parried Otto's attack, and drove him back another step. Otto lost his balance, and had to hop up another stair to keep upright. Finally a safe distance from Otto's deadly sword the officer dropped out of the line of fire. "Shoot, goddammit, *shoot!*"

Otto found himself staring down the length of the stairway into the barrel of a wheel lock pistol. Time seemed to slow down. Otto watched the soldier jerk the trigger. He saw the wheel rotate at the side of the weapon, creating a shower of sparks. As he tried to dive of the way he saw the flash of the pan igniting.

Otto felt pressure in his head, and his vision went black. He was angry at his failure.

\* \* \*

Hignall's ears were ringing; the German—Hignall assumed he was the German—was sprawled across the stairway. Hignall rose to his knees and looked up the stairs. There was a woman standing at the top. He smiled through the smoke. "Hello, Jenny Geddes."

The voice that came back to him was hard as steel on a midwinter's night. "You have the advantage, sir. I don't believe we have met."

"Lieutenant William Hignall, the King's Men."

"Aren't you supposed to say, 'at your service,' or something like that?"

"Normally I would, but in this circumstance—Well, I'm sure you understand." He smiled, and started to stand.

A heavy footstool raced toward his head. He dropped to the stairs again, and the soldier behind him caught the stool hard in the face. He saw the man stumble and fall. Hignall pursed his lips as he saw the angle of the man's neck. Broken.

He got up again and looked to the top of the stairs. "You bitch. I've had enough out of you." Sword in hand he kicked the sprawled body of Otto to check for signs of life before continuing up the stairs.

The woman was waiting at the top. She had her arms extended, and in her hands was what had to be a pocket pistol of some kind. Arrogantly he reached out with the blade to slap it out of her hand, but it fired. Something tore along his cheek. He felt the wound with his left hand. Something had gouged a gully through the flesh of his cheek and torn up his ear. He tried to curse her, but it hurt. He shook his head to clear the fog and the pain. He went for her again, a lunge with the blade. The gun popped again and the side of his neck stung. His hand went to it. *What the hell is happening?*

He took another step up the stairs. She backed up. He thrust at her with his sword.

The gun popped a third time and his shoulder exploded with pain. He dropped his sword.

She now took a step toward him. He raised his other arm to tell her to stop. There was another pop, louder this time, and his hand, wrist, and forearm exploded in pain. He felt pieces of bone and blood and tissue splatter his face.

She came closer. He could see it clearly now. It was like no gun he'd ever seen before. Something buzzed by his ear, like an angry insect. He could not believe what was happening to him. *It wasn't supposed to be like this, not in some run down building by some bitch of a wo—*

He never finished the thought. A bullet went into his right eye and tore through his brain.

\* \* \*

Jenny sat in the library at the MacKay house, with her daughters. They huddled together on a sofa, but Elspeth and Dolina were both asleep. Julie entered the room and quietly closed the door behind her. She sat across from them, and looked at the girls.

"You have a nice family, Jenny."

Jenny had a far off look in her eyes. She shook her head slightly.

"What is it, Jenny?"

Jenny glanced down at the girls, then back up at Julie. "You didn't tell me what it would do to him. I kept going until it was empty. At his face."

"Jenny. I know it is hard to kill someone. But if they are going to hurt you, or someone you love, you need to—"

"No, lass. You don't understand. His face, that man's face. I want to remember it for a long time. That wee gun of yours made it look like a slab of meat with holes in it."

Julie's eyebrow arched in surprise. "What?"

Jenny smiled. "That man and his men were bastards. Deserved what they got. I know that, and God

knows that too. That don't bother me none at all. That is simply doing the right thing. I want to remember that face, because of what it means to me. Bloody tyranny, that is what it represents. Just bloody tyranny. That is gonna be a face I remember for a long time."

"You're sounding like a Committee of Correspondence recruiter."

"Aye, and maybe that is what I should be a doing with my time, instead of greengrocer. Something better for my kids, better world."

"You are not sounding like a stubborn and hard-headed Scotswoman, Jenny," Julie said.

"Aye, that's true. But that don't mean I can't go doing that in a hardheaded and stubborn way." She giggled quietly. "And I throw a mean stool."

"Did you really get one of those guys with a stool?"

"I certainly did. The one that shot Otto. The bastard."

The door opened and Alex stuck his head in. "He's awake."

Jenny got up as quickly as she could, extracting herself from her sleeping daughters, and dashed over to Alex. "Can I see him?"

Julie came up behind her. "He has a nasty concussion. The bullet grazed his skull. So be very quiet, he is still a little out of it." They went down the hall, past Robert MacKay's room, and into another room on the first floor. The curtains were drawn, keeping the light to a minimum, and in the bed was Otto, his eyes open. Somewhat glazed, to be sure, but still open.

When Jenny walked into the room, he smiled. "I am glad to find you alive, Jenny Geddes."

She walked quickly to his bedside, smiling back at him. "I'm glad to find you alive too, Otto. How are ye feeling?"

"Not too bad, considering the circumstances. So, I guess we won then?"

"Aye, we did at that. We have taken the liberty of using your newly arrived printing press to put up posters, explaining who was behind the attempt to capture me. The king's men have been asked to leave Edinburgh by the privy council, and our Mr. Lauder is not likely to be a lord of anything. He lost a few friends on the council, but nobody is willing to come out and say he was behind it. And the mood of the city is—interesting." She moved closer to Otto, and now held his hand. "Ain't that something?"

Otto smiled that curious smile, and squeezed her hand.

Jenny froze. She looked at her hand. She looked at Julie, who was smiling at her with an overtone of smugness. She looked at Alex, who was pretending not to see anything except the ceiling. Jenny snapped her hand back and glared at Julie and Alex. "Just because I held his hand, don't mean a thing. Don't you go supposing what I be thinking. We've got a world to change. No time for nonsense. There be a whole world of no-good lords and ladies that will need a stool thrown at them now and again. That's what I'm gonna do."

She dug her pipe from her pocket, popped it in her mouth and folded her arms in front of her. "Men can just be a pain in the arse."

\* \* \*

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# Mrs. Schumacher

**Written by Gorg Huff and Paula Goodlett**

"Lena! Lena! It's here!"

Helena looked up from the pot she was stirring to see her cousin Dorothea Kellerin pushing open the door. The girl was barely able to hold on to the basket of food she'd bought at the market, considering the thick book she was waving. "What's here? And be careful with that. You'll bruise the apples if you drop them."

Dorothea pretty much ignored the admonition, which was fairly standard for her, especially when she was excited about something. Worried for the apples, which wouldn't store well if bruised, Helena said, "Come, Dara. At least put the basket down first."

Dara managed, finally, to get the basket down without mishap, but it was a near thing. "Come look at this, Lena."

"Again I ask, what is it?"

"The new Wish Book." Dara was practically bouncing with excitement. "Remember? We got the first one, the little one. But with all the fuss this past summer, we never got another. Until today."

Trust Dara to call it a fuss, Lena thought. A rebellion, one that had caused quite a number of deaths, not to mention the uproar here in Bamberg. Why, you still saw mounted men wearing Ram armbands on the street. Of course, they were actually a part of the State of Thuringia-Franconia Mounted Constabulary. The second company had decided to keep the ram as their symbol. She leaned over the book to see what Dara was pointing at.

"I want those." Dara pointed at the divided skirts that had become so common. "And they're cheap. Probably cheaper than you can make them, even."

Lena looked closer. It was getting to be time to buy Dara one of the suits of clothing that she got each year. Room, board and clothing, along with a small amount of wages was how she paid her cousin for her help. It was the common arrangement. Dara made pin money by doing chores or errands for others in her spare time, but her primary job was to help Lena and her husband Peter with the housework and work in the shoe shop. Her wages wouldn't be due until Dara left them to marry, as was usual. The young—and Dara was only twenty-two—didn't usually marry until they'd saved enough to start their own households. "That does seem to be a good price, Dara. But how do you know they would fit?"

"They have a sizing chart, they call it."

"Very well. I'll look at it after supper. For right now, though, we'd best get busy."

\* \* \*

Lena looked over the section of shoes with increasing concern. The shoes were much like her husband made. At least some were. Some were better. Not fancier, but better designed. There were pictures that showed the structure of the shoes: lining, padding, support for the arches. Dead cheap, too. She began to worry, then, as she turned the page, she got very worried. Boots, this time. And, not just the fashionable boots, either. Work boots, like any man would wear. And again, dead cheap.

How was Peter going to compete with these prices? They even, she wasn't too surprised to find, had a shoe sizing chart on the pages. Three, in fact. Men's, women's and children's. All sorts.

This was bad news.

\* \* \*

Peter Schuhmacher looked up as Lena came in to the shop area of their home. "What's wrong, dear?" he asked as soon as he saw her face. They were a good match. She took care of the books and he made the shoes with the help of a single journeyman and two apprentices.

"This!" She showed him the book.

He looked at them and immediately realized the quality of the shoes. Still, the structure of these shoes and boots would require a whole lot of extra sewing and some really good glues. So he wasn't really worried. He did look at the prices, but the truth was that he still wasn't all that comfortable with the new money that the up-timers had introduced. Yes, thirty dollars for a pair of boots seemed a little low, but maybe not. Peter wasn't all that sure what thirty dollars was worth.



Lena was quick to inform him that thirty dollars was less than half of what he would charge for a pair of boots.

"They can't do it. There's no way that they can make these boots for that little. Especially these boots. Look here." He pointed at the picture showing the various layers of the boot sole. "It's not so much the materials; it's the time it would take."

\* \* \*

Peter spent a long time explaining to Lena why the shoes in the catalog could not possibly be made or sold for the price listed. By the time he was through, Lena was about ready to pound on him with the boot heel. At the same time, she knew he was right. She knew enough about the business, about how long it took him to do the cutting, the sewing, and the nailing necessary to make a pair of boots.

In any case, Peter, having convinced himself that the so-called Eisenhauer Shoe Company couldn't do it, had decided there was nothing to worry about.

\* \* \*

Herr Kacere was polite. "I'd like to help you, ma'am. I really would. But not at the cost of seeing more shoeless kids in winter."

"Our prices are fair, Herr Kacere! We do not cheat people." It had been hard to believe at first, but Lena was able to get an appointment with the SoTF administrators with only a few days delay. Everyone knew how busy the up-time administrators were.

"I'm sure they are. For handmade boots and shoes." Herr Kacere sighed and Lena could tell that he had had this conversation before. "Ma'am, you want to know what shocked us most, right after the Ring of

Fire? It was how expensive everything was. Everything but labor, anyway. Before the Ring of Fire, some of the older folks used to talk about the horrors of inflation all the time. How, back in the good old days, they used to be able to buy a hamburger for a nickel, without considering the fact that when they could do that, a man got paid around a dollar a day. Just before the Ring of Fire you could buy a hamburger just about like the ones they talked about, but it would cost a dollar. But in that time, even at minimum wage, a man got paid around forty dollars a day before taxes. The nickel hamburgers were actually more expensive than the dollar hamburgers. Twice as expensive."

Lena wasn't at all sure what John Christopher Kacere was saying, except that it came down to "No, the SoTF would not challenge the mail order catalogs and their prices." And a part of her, a good part, wanted to leave in a huff. But the practical, pragmatic part kept her in her seat as Herr Kacere continued. "And food was the least of it. More durable goods like shoes, beds, houses, and tools went down in price even more over the years. Since the Ring of Fire, we—at least those of us who are dealing with the economic impact—have spent quite a bit of time trying to figure out what happened. It had a lot to do with assembly lines and production machinery. Mass production in general. I'm not sure of the details of how these boots and shoes listed in the catalog are made, but I can make a fairly decent guess. Somewhere around Grantville or somewhere on the Elbe, there is now a factory. In that factory, there are machines to cut the leather and shape it, to sew it together. And they don't make one pair of shoes at a time. One person at one machine is cutting the leather used in the toe, then passing that piece on to someone else. The next person on the line does subassemblies, sewing the toe to the side, or however it's done."

Herr Kacere shrugged his ignorance. "Then the piece goes on to final assembly. What matters to us is that if you add up all the time of all the people working on that line to make one pair of boots or shoes, it's a lot less than it would take in your husband's shop. And that's what lets them make shoes for so much less. Plus the fact that since they're buying a lot of leather, they probably get a better price on it than you do.

"Ma'am, I realize this isn't really fair to you or your husband, but I have to weigh that against what's best for all the people who need shoes. The best thing I can suggest to you is that you try to modernize your shop. Go look at how they do things in Grantville or wherever the shoe factory is. See about getting a loan and buy some sewing machines and leather cutters or whatever they're using."

\* \* \*

"Peter, we must."

Peter shook his head. "No, we must not. Lena, I know you are concerned but a trip like that would be expensive. Wait till these shoes get here. And the buyers find out they are made of paper or gut."

Lena wanted to go immediately to Grantville to see about buying the machines and setting up the assembly lines needed to compete with the boots and shoes in the Wish Book and the other catalogs. That, however, was not to be. Peter was not convinced. Not yet. He wanted to wait and see.

"Already we have fewer orders."

"I know. But they will be back." Peter sniffed. "When they see what they have paid good money for. And after buying from a picture in a book, they will deserve what they get."

The most irritating thing about it was that little bit of uncertainty. It was just possible that Peter was right. After all, how much could the assembly line and production machines that Herr Kacere spoke of really speed things? They had to be scrimping on materials as well, didn't they?

\* \* \*

Over the ensuing weeks, the number of shoes and boots ordered from the shop decreased a bit more. Finally, Lena had what she needed to convince Peter that they must act. The first order of shoes and boots had arrived.

Karl Strauss flinched a bit when he saw Lena in the market. It didn't take her long to see why, either. Karl was a clerk and scribe and had been a fairly regular customer of Peter's. But now! Lena looked at his feet. "Penny loafers, I see, Karl."

Karl blushed.

Lena considered for a moment. Karl was young. She could probably bully him a bit. "Come, Karl. Tell me. Why?"

"Business has not been good, Frau. They were much cheaper. And by adding the thicker 'socks,' they are more comfortable, as well."

Lena did her best not to glare. Some of the so-called new styles in clothing for men struck her as ugly. Yet here stood Karl, not only with penny loafers, but with something called "cargo pants." She wasn't sure, but the models in the Wish Book did not have the leg pockets so full that they bulged. She did agree that it was nice not to need to knit stockings quite as long, now that pants were longer. And the thicker yarns that had come into fashion did work up quickly.

"Up-timers." She shook her head. "Please come to the shop and let Peter look at them. Dara will be glad to see you."

\* \* \*

Dara bustled around providing refreshments. Probably showing off her "domestic skills," Lena thought a bit darkly. Dara was yet another of the younger people who was enamored of up-time ways, styles of clothing and attitudes. Dara was particularly fond of the clothing styles. She was forever drawing new things she'd like to make for herself, and saving money for the fabric to do so.

Many of the younger people were adopting those ways wholesale, without thinking. Lena even agreed with some of them. But not all. Most especially not the lack of support for the guilds, the lack of consideration for custom. And she wasn't at all enamored of Dara flashing her eyes at a clerk. Dara's father expected her to marry one of the farmers in their village, once she'd earned her dowry. If anything came of the relationship, one or both of them would be ruined. Dara, if he refused to marry her, and Karl, if he didn't refuse. Yet here she was, flirting with him as though it was perfectly all right.

With Dara's eager help, she talked Karl out of his shoes so that Peter could look at them closely. And with Dara cooing at him, he didn't balk at letting her inspect the sock, either. Even those could be made with one of the up-time machines.

After Karl had left—eagerly escorted to the street by Dara—Lena gave her husband a look. "Well?"

"Very good leather," he admitted. "Very good. And I could not pull the glue loose, not without damaging the shoe."

"We must go inspect the factory."

Unfortunately, that statement started the boys, Endres and Benedict, off. And they were still going at it when Dara got back. Everybody wanted to go to Grantville. Then Peter got that mulish look on his face and shouted them down.

All in all, it wasn't a very pleasant evening.

\* \* \*

"Only one order this week, husband. And that for a pair of boots with the buyer's family crest on the side. Something the Wish Book doesn't offer, I should add. At least not yet, thank goodness."



"So? The boots for the mounted trooper will bring a lot of money."

"And take a lot of time. And there's only one new order." Lena slumped in her chair. "Peter, you must listen to me. The factory-made boots will ruin our business. They will ruin the business of all who do not modernize. We must do this and we must do it soon, else we will be left behind in this new world."

Another effect of the arrival of the first of the new shoes was that the shop's business had a precipitous drop. Even several canceled orders. People who had believed Peter about the impossibility of making good shoes for that price were taking a new look.

Peter sighed and looked depressed. "Very well. Hans can finish those boots. We will go." Then he looked at the eager faces of his sons, as well as the hope in Dara's eyes. Well, she was Lena's cousin. And she'd be a help on the road, keeping the boys occupied.

"Yes. We will all go."

\* \* \*

And on a bright, sunny morning, they set out. North, over the mountains—and they really were mountains, even if they weren't a scratch on the Alps. Unfortunately, all did not stay bright and sunny. It started to rain two days out of Bamberg, and kept right on raining for over a week.

Then they reached the railhead a bit south of Saalfeld. The railroad south of Grantville was little more than a spur line. They were informed it went to the steel works of Saalfeld and to an iron mine a bit south of that, mostly to make it easier to get the iron to the steel works. Still, a little transshipment town had grown up around the rail head and a warehouse had been set up at the end of line. It was, they were told, a temporary warehouse that would move when the railhead did because the railroads could carry so much more than a mule train, or even one of the new wagon trains, that cargo shipped by rail piled up waiting for more traditional transport.

And there was "a line planned to go to Bamberg once they could scare up the steel for the rails." So the railroad agent informed them. "For now you folks are standing right at the south end of the Golden Corridor. From the mouth of the Elbe to here, between the rivers and the rails. Shipping is cheap and easy. When they get the railroad down to Bamberg, it will link to the Rhine." It made the last of the trip easier, but at the same time was a warning of things to come. Finally they reached Grantville, and there was no room at the inn. At least not at the sort of inn they could afford.

Eventually they managed to rent a room in one of the new subdivisions just outside the Ring of Fire. John Christopher Kacere had provided them with letters of introduction.

\* \* \*

Lena had to stop herself from drooling at the thought of buying some of the goods she saw on display. By the time these goods actually reached Bamberg, the price was a lot higher. But she was determined that the first thing they had to do was check on the Eisenhauer Shoe Company.

They took their letters of introduction to the State of Thuringia-Franconia Office of Economic Development. Who in turn directed them to the Eisenhauer Shoe Company. It was then they learned that the factory wasn't in Grantville. "Yes, sir, the marketing headquarters are here in town where we have access to the computer and the telephones. But the factory, we moved that up north of Halle on the Elbe. Oh, must be three . . . no, four months ago. To make shipping easier. We can ship raw materials by barge and ship out the shoes the same way. Got access to the whole navigable Elbe that way."

The clerk was what they had learned was called an "old Grantville hand," a down-timer who had lived in or near Grantville for several months. It was clear to Lena that before the Ring of Fire he had been a villager. And from the pleased little smile on Dara's face, she could tell the same thing. Apparently the up-timers really didn't care if you were a villager or a townsman. This was going to make it even harder to convince the already rebellious Dara to keep her proper place.

"How can we get there," Peter asked the clerk.

"It's no problem. You can take the train part way and a river barge the rest. It's a regular stop for the barges these days. It's not even all that expensive. And Herr Eisenhauer likes visitors. There's even a tour."

\* \* \*

"Here you see . . ." The guide pointed. ". . . our cutting press. There are six processed hides and this press is cutting boot soles. We get twenty left and twenty right soles from each processed hide."

Just then the press dropped and in the blink of an eye two hundred and forty boot soles were cut. Lena looked at Peter who was staring openmouthed. Two hundred and forty. Peter was skilled and hard working; he could cut a single boot sole in less than a minute. But two hundred and forty. Even if you included the time it took to stack the hides on the cutter . . .

Their guide was still talking. "These pieces are sorted by size and then moved by cart to the sewing line . . ."

Lena walked along, following the young guide, taking note of each step. There were some places where delays happened. Sometimes the cutters were ahead of the sewing, sometimes one or more of the other operations were a bit delayed while someone finished a different operation. But the speed! Such speed.



"The up-timers tell us, and you can see pictures on the wall there, that back in their time, hundreds of thousands of pairs of shoes came off of a rolling belt, were packed in boxes, then transported by their trucks to 'retail' locations and warehouses."

Lena couldn't quite imagine hundreds of thousands of shoes. Nor could she quite imagine the rolling belt, until she took a good look at the picture the guide pointed to. It was all quite a shock. Peter's face was as pale as she'd ever seen it.

\* \* \*

Peter was drunk for the first time in ten years. And for the first time ever, it wasn't a happy drunk. He wondered if it was because he wasn't drunk enough, then looked down at the little glass that had held the very potent drink that the bar tender called "Shine." The bartender, a most helpful fellow, had informed him that it was called a shot glass because if you emptied it in one gulp you felt like you had been shot. By that standard Peter had now been shot several times. It hadn't helped. Because the killing blow had been delivered before he ever got to the bar. That had been done in the shoe factory, where they had killed his pride in what he did, his hope for the future, his dreams for his children.

Lena was upstairs in a surprisingly nice room, especially considering that she would be a homeless beggar soon. Dara and the boys were in Grantville, where they were no doubt spending the rest of the family's savings. Which might be just as well. At least they would have a few days of fun before the end, which was more than most of the shoemakers in Bamberg would have—or their families, either.

After due consideration, Peter decided that if however many shots he had taken had not put him out of his misery, one more probably wouldn't do the job. He kept seeing that press coming down like a headsman's ax. Cutting off his future as it cut out soles. In a way, the worst part of it all was that now having seen it, he understood exactly how it worked. It was so simple. Straight forward. In a way, it wasn't even that new. He used tools in his shop. He often separated out the work between the apprentices. Sometimes everyone in the shop had a hand in making a single pair of shoes. He could follow each step along the assembly line in the shoe factory, see what it did and why. He could even think of improvements. Not that that did any good. It must have cost a fortune to put the factory together. Peter knew that Lena thought of him as a stubborn old fool. He figured she was probably right in a lot of ways. He'd never been all that good with numbers or accounts or keeping records. But he had a craftsman's eye and a craftsman's sense. He knew how things fit together . . . for all the good that did

now.

\* \* \*

Lena paced. Then paced some more. At one point, she seriously considered pulling Peter out of the bar before he got completely drunk. Then she considered joining him and getting drunk herself. Then she paced.

Right up to the tour of the factory, Helena Kellerin had had a plan. They could raise the money for improvements to the shop. It wouldn't exactly be easy but the up-timers were actively loaning money for modernization. To raise the money, they would need to present a prospectus to the bankers. A plan with decent detail describing how they were going to turn that money into an improved, more productive shop. Lena had been convinced that it wouldn't be that difficult. She would draw up a prospectus and present it to the bankers. They would buy a couple of the sewing machines that Herr Kacere had mentioned, maybe some improved leather shears. They would modernize the shop and start producing more shoes for less money. That had been the plan right up till the tour of the factory.

But they hadn't seen an improved shop. They had seen a factory.

She hadn't told Peter of her plan. It had been hard enough just getting him to come here to look at the factory. Now she was glad she hadn't. It would have been embarrassing. With all the changes in the world in the last few years, she'd studied everything she'd been able to find about how money worked. Especially the new up-timer economics. She had known about money of accounts. In fact, much of the shop's income came from people who didn't have silver to pay. The price would go into an account book and the shop would get paid when the crop came in. And the shop did the same thing with other merchants. It had taken a while but what she had finally realized was that all money—even pure silver coins—was just another form of money of accounts. If you understood money, you understood everything.

Except you didn't. Lena had, she was still convinced, gotten a good handle on up-timer money and economic system. But when she saw that factory, she realized that though she understood the process of mass production from the money side, she didn't even have the start of a handle on it from the . . . uh . . . making stuff side. She could grasp easily enough what each device did. It was the way it all fit together that had her stumped and, from his expression, had Peter stumped as well. Peter was set in his ways. He'd been making shoes for over twenty years, ever since his own apprentice days. There was no way that Peter knew how to make these new-fangled methods work. Just no way. He was too determined to keep on with the old ways.

They were sunk. Aside from the process part, there was the administrative part. There would be so many people to deal with. Employees, not apprentices. You could get to know everyone in a shop . . . but a factory? Lena wasn't sure. With a few apprentices, and a journeyman or two, you could rapidly learn which ones wanted to learn and which were little monsters whose parents had paid the apprenticeship fee to get them out of the house. But the shoe factory they had just visited had one hundred fifty-three employees. Most of them had families. Over three hundred people lived in this town, simply because of the shoe factory.

There were only so many changes a woman wanted to deal with. Life as she knew it was falling down around her ears. Dara making eyes at a clerk. Her own sons wouldn't be following their father into his trade, because that trade wasn't going to exist in a few years.

How were they going to live? Admittedly, Peter could repair these factory-made shoes and boots once

they needed it. It would be a horrible comedown. He'd hate it, cobbling stuff together from scraps. Worse with prices so cheap—and she was pretty sure they were going to get even cheaper—how many people would have shoes repaired? What if it was cheaper to just order a new pair? She threw herself on the bed. She considered weeping. But then her stomach growled and she realized that what she needed was something to eat. And maybe a drink. Or two. Three at the most.

\* \* \*

"*Aiiee.*" Peter flinched, both from the bright sunshine and the noise of the barge being loaded. Loaded with crates of shoes which gave yet another reason to flinch.

Lena found herself squinting and flinching as well. Probably, she thought, that last drink hadn't been a real good idea. Her head hurt. A lot.

Obviously, so did Peter's.

Once they'd found their seats—no staterooms for them. They were traveling steerage. Peter leaned his elbows on his knees and buried his head in his hands.

"I'm sorry, Lena. Sorry it took so long to realize that you were right."

Lena started to shake her head, then thought better of the idea. Her stomach wasn't exactly settled just at the moment. "It doesn't matter, Peter. I didn't realize how complicated all this was. We can't build or run a factory like that, anyway."

He snorted. "I couldn't bring myself to believe it without seeing it. But now that I have, it all makes sense. Perfect sense. I can see how they do it, every step of the way. From leather and wood to finished shoe. It's not even hard. For all the good that it does. We're sunk, whether I understand the factory or not."



That took a moment to percolate through Lena's brain. "You understand it? You know how the machines work?"

Peter waved his hand. "Simple. I could have most of them built in Bamberg, now that I've seen them. Except for the sewing machines. I know exactly what they're doing. It's still shoemaking, just . . . ah, simplified. Well, not exactly simplified. Taken apart. All of the steps in making shoes are still done, but they're done in a different order and broken down into smaller bits than I would normally use. Even with the new apprentice." He shrugged. "But I can't afford to do it. Oh, I could reorganize the shop more along the lines of the factory. Probably will, when we get back. It might keep us in business for an extra few months. But it won't be enough, not without the machines."

Lena's hangover began to clear up. Hope for the future began to trickle back. "What did you say?" she asked, rather louder than she intended.

"Please! My head . . . what *did* I say?"

"You said you knew exactly what they're doing."

He nodded, then flinched at the movement. Lena understood. The morning sunlight off the river wasn't helping either. Nor the chug of the steam-powered barge.

"Oh, yes. Simple. But we have no money."

"Dear . . ." Lena smiled. "We have no money, true. But we can borrow it or get investors. Let me explain how to get it . . ."

\* \* \*

A week later, with funds running low and two rambunctious boys to handle, not to mention Dara who was driving her crazy, Lena was about to bust. Red tape, they called it. The loan they needed was too large for the small business loans section of the Committee Savings and Loan Association. So she and Peter had been to see the people at the Grantville Bank, as well as the people at the credit union. With Peter agreeing, nothing was going to stand in her way if she could help it. The family's future was at stake.

She thought she had the credit union convinced, because of the time factor. They had a window of time to get up and running before the railroad connected the northern and southern parts of the SoTF. If they could get the sales base, and name recognition, along the Rhine and Main Rivers established before the railroad came through, they had a good chance of success.

"Come along, Endres," Lena said. "You're better with numbers than Benedict, so I want you to see how the bank operates. Benedict, you and Dara stay here with your father and work on the design for the assembly line."

On the way to the credit union, Lena had Endres recite what he was learning about the business. No longer would it be possible for him to merely understand the economics of a single shop. He'd have to learn about bigger businesses.

"Mother?" he asked after a pause.

"Hm?"

"What about the other shoemakers in Bamberg?"

Lena looked at him, wondering what had brought that on.

"Johan's father." Endres explained. Johan was a playmate of his. Johan Senior was prominent in the Shoemaker's Guild. "What will they do if we build a factory and take away their business?"

"That's where the stock comes in," Lena said. "Hopefully, they will be willing to invest. That way they will each have a part of it." Lena really did hope that was the way it would go, but she had also planned for the possibility that it wouldn't. If they had to, Lena was pretty sure they could rent the property needed to put up a factory outside of town. "If they join us, they will bring what they know with them. Your father says that knowledge can be combined with mass production techniques. So we can have a line of custom-made shoes and boots for people with more money or special needs."

"I'm not sure Johan's papa is going to be happy about that. When we left Bamberg, he was very angry about the Wish Book. There was to be a guild meeting, Johan said. And he said that Papa would be in trouble . . ."

Lena looked down at her eight-year-old son. "Not exactly. The guild knew we were coming and agreed to it. It is true that they were thinking more in terms of getting the government here to crack down on the catalogs. And it wasn't just the shoemaker's guild. Many of the guilds were upset at the products for sale in the catalogs." She smiled. "Some people will bury their heads in the sand no matter what. I knew that

the government would not restrict catalog sales to satisfy the guilds. But I did deliver their request. Demand, really. I was told that it would be filed with all the others. Then I was told that less than ten percent of the population lives in the cities, and now those villagers have a vote in how things get run. So the guilds will have to change, as they should already know."

\* \* \*

"Yes. Just like that." Peter smiled. "Very good, Dara."

Dara glanced up at him. He was looking back and forth between her drawings and a book in English. Peter didn't read English and neither did she, but they could look at the diagrams and use them as a basis for what they were doing. They had also hired an old Grantville hand to translate. They couldn't afford a real up-timer but Al, as he said to call him, had had two years in Grantville's high school. He had gone over the flow chart and described what was in the boxes and what the different shapes meant. It was, he said, a graphic description of an assembly line.

Dara was having fun with it. She'd always been able to draw things, but it normally wasn't something she got a lot of time to practice. She was just too busy. This was something between drawing and writing. Like drawing ideas. It was interesting, but not as much fun as the drawings she'd made of the new clothes she wanted to make. Some of the up-time clothing she'd seen was wonderful. Some of it, like "sweatshirts," was horrible. But she had ideas for a lot of new things.

The days in Grantville while Peter and Lena went to Halle had been eye-opening for her in more ways than one. There was no way, she'd decided, that she was going back to being Lena and Peter's servant, cousin or not. There were too many other options now.

The wages, board and clothing that she received from them were dwarfed beside what she could earn here in Grantville, even as a maid at the Higgins Hotel. And if she took a job at the Higgins, she'd have the time to take some classes and improve her prospects. Becoming a farmer's wife was less and less appealing.

The whole world was opening up for her. And she wasn't going to let it pass her by.

The only problem was: how would she tell them she wasn't going back to Bamberg?

"Good enough," Peter said and for a second Dara thought he was talking about her plan to stay in Grantville. Then he continued. "That's the tongue and top subassembly, which is going to be one of the slower parts. We may need a double line there, but we won't know that for sure till we've been up and running for a while."

\* \* \*

Dara answered the phone. Dara always answered the phone, almost from the moment they had arrived in Grantville. Lena looked on with irritation only slightly leavened by amusement as Dara raced to reach the instrument before anyone else could. A few moments later the phone was turned over to Peter who spoke for a few minutes. Then, with a bemused expression, he informed Lena that the Eisenhower people would like to talk to them. Lunch tomorrow at the Higgins Hotel.

\* \* \*

"So you come to our plant to steal our secrets and go into competition with us." Herr Eisenhower smiled to take the sting out of his comment, but the smile was just a little bit forced. Lena could tell.

"It is just business, Herr Eisenhower. Where did you get the idea for your factory?"

Herr Eisenhower nodded a bit shamefacedly. "The same place the other shoe companies did. From the up-timers and the national library. In any case, we heard about your proposal. You do have an excellent

point about the railroad. The transportation bottleneck between the Elbe corridor and the Rhine is making deliveries difficult and expensive. Considering that, we have a counter proposal to offer. Have you ever heard anything about something called a franchise?" Herr Eisenhauer had used an up-time word that neither Lena nor Peter were familiar with.

"No," said Peter. "What does that word mean?"

Hermann Eisenhauer explained, and neither Lena nor Peter were impressed. In fact, Lena was a bit miffed about it.

"You seem to be saying that we should pay your company for permission to make shoes, which would be sold under your label. And then we should also pay you for each pair of shoes or boots we sell. Why should we do that? We can just as easily make our own shoes, sell them on our own label and not pay you anything." The more she thought about it, the more miffed Lena got. It seemed like a very good deal for the Eisenhauers but not for her and Peter.

So Herr Eisenhauer explained again, this time saying that was just the definition of a normal franchise. What he had in mind was a little bit different. His company was willing to put up part of the startup capital and provide technical support in exchange for a percentage of the profit and, equally importantly, quality control. "If the Eisenhauer name is going to be on the shoes, they have to be good shoes."

Peter was ready to leave at that point. The suggestion that shoes he made would be a poor quality was offensive. Especially since his shop had usually made workaday shoes rather than the fancier shoes for the wealthy. Peter's shoes were plain, but well made. Unfortunately, a lot of people fail to make the distinction. In other words, he took Eisenhauer's comments personally.

"No offense, Herr Schumacher, but not knowing you or your products, how can I possibly know that? In fact, I am pleased that you insist on quality in your merchandise. But there are temptations in a factory and you need quality control. Suppose someone slips poor quality leather into their shipment to you, and it goes unnoticed till the shoes are finished. It can happen. I've seen it happen. It's then that you need a real stickler on quality control."

The conversation continued, going back and forth between what Peter and Lena needed and what Eisenhauer wanted for it. Winding around to the political situation in Bamberg. They were going to have to offer the guild something. The opportunity to invest looked like the best bet. Besides, Peter and Lena didn't have all that much money. Yes, they could get a loan for some of it but loans mean interest and the possibility of foreclosure. If the Eisenhauer people were going to be putting up the lion's share of the money, they would want both control and the lion's share of the profits. There was also the possibility of the Eisenhauer people sending someone to Bamberg or perhaps Frankfurt to set up in competition with them. Perhaps in partnership with local shoemakers, who had more money to invest or were willing to take a smaller cut. Nothing was settled at dinner but everyone was cordial, keeping their options open.

\* \* \*

The next day Lena went to the credit union to discuss Eisenhauer's offer and the problems with it. The biggest in Peter's view, and Lena tended to agree, was that they didn't know whether the guild would see reason. Or how much reason. Some of the guild members would be willing enough, drawn in by the potential profits. Others would reject the whole thing because it wasn't the way their father did business. Some would fear for their political power and social position. Not that the shoemakers guild was one of the prominent ones in Bamberg, but still the position of guild master—even of the shoemaker's guild—was not to be sneezed at.

The reason that made it difficult is that it meant Peter and Lena would need to go it alone for an indeterminate amount of time. If all or most of the members of the shoemaker's guild pitched in, there would be enough money to put the factory together, almost without the Eisenhauer's investment. They would still want that investment, Peter and Lena agreed, because through the already present catalog ads, it offered a ready market. As soon as they got into production, they'd be selling shoes. Also technical support would help a great deal in putting the factory together in the cheapest, most efficient way.

After she had explained the situation to the loan officer at the credit union, that worthy had a suggestion. A drawing account, rather than a loan for a fixed amount. And a limited power of attorney for the credit union, given the Eisenhauer's involvement. The credit union was now prepared to approve the loan amount, secured by stock in the company. Peter and Lena would make the deal with the Eisenhauer Shoe Company, then go back to Bamberg and get as much of the guild as they could, or as wanted to, to invest in the new company. Then the credit union would loan the remaining amount, transfer the funds and take possession of the stock as security against the loan. There were more details about how long they would be given to put the new shoe factory in operation, but that was the gist of it.

\* \* \*

Lena, Dara thought, might as well be glowing, she was so happy. Which might make this the time for her own announcement. At any rate, with the family leaving in two days, she had to do it.

"Ah, Lena?"

Lena smiled at her. "Yes?"

"I'm not going back to Bamberg."

"*What?*"

Dara kept herself from flinching at the shout, but only just. "I'm not going back to Bamberg. I got a job. Right here in Grantville."

"What kind of job?"

Dara explained her plan. She'd taken a job as a maid at the Higgins Hotel, and was going to night school, then look for better work. "I don't want to be a servant, Lena. And I won't have to be, not in a couple of years."

\* \* \*

Lena leaned back in her chair, remembering. She'd been lucky. Her father was a prosperous farmer. But Dara's father hadn't been quite . . . well, that didn't need to be spoken of. Uncle didn't like work as much as Papa had, perhaps.

So Lena hadn't had to put herself to work to earn her dowry. She thought about all the changes, then she took a breath. "Why the Higgins?"

"I already know how to clean," Dara said. "I don't know how to type and my reading isn't as good as it needs to be. I'll have to work at that."

Lena took a good look at Dara, at the way she'd adapted her own clothing, and remembered all the drawings Dara had shown her. She thought a moment. "Will you let me help you? Perhaps we can do better than maid."

\* \* \*

Dara barely kept her nervousness under control, while Hermann Eisenhauer looked at her drawings. One

thing she did know was shoes. You couldn't really avoid learning about them if you worked for a shoemaker. Finally, Herr Eisenhauer smiled.

"You've caught it. Exactly. A blend of up-time and down-time. Just like the clothing, even the language, is changing, so will shoes. And homes. Almost everything." He looked at the drawings again, then smiled at her. "Welcome to the company, Fraulein Shoe Designer."

"Fine," Lena said. "That's settled. Now all we have to do is persuade all those fools in Bamberg to go along with the plan."

\* \* \*

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# Bats in the Belfry

Written by Garrett W. Vance

*Late May, 1634*

Pam Miller walked briskly down Grantville's main street, hoping to avoid the friendly looking fellow heading her way from the Freedom Arches. It looked like he may be trying to get her attention; she had no idea why and was in one of those moods where she didn't want to find out. She was about to cross the street to put some distance between them but a team of horses hauling a very heavy looking metal tank on a flatbed truck trailer had blocked her path. With a furtive glance back toward the smiling man she started to move around the back of the slowly moving procession—too late!

"Pam! Pam Miller! I've been looking all over for you!"

Pam instinctively paused slightly, losing her chance to make a break for it under the rather flimsy excuse that she hadn't heard him call out. She turned slowly toward the man walking swiftly toward her, hand raised in a cheerful wave. She made herself smile, realizing that it was Grantville's Baptist minister.

*What could he possibly want with me? I'm a Methodist, and I can barely call myself that anymore!* "Oh, hi, Reverend Green."

"Call me Al, please, I'm out of uniform—but never off duty!" The spiritual leader of Grantville's Baptists stuck out his hand to shake Pam's; his grip was warm and gently firm, a well practiced social grace that succeeded in conveying a sincere sense of welcome.

"So, are you excited about the wedding?"

*The wedding? What wedding?* Pam felt her stomach lurch with anxiety. She had a sudden suspicion, but there was no point in pretending she had been informed, men of the cloth could typically spot a fib a mile away. "What wedding, Al?" This produced a nonplussed expression on the reverend's face.

"Oh! Oh my, I'm sorry, Pam. I thought you would know by now . . . Well, I suppose Walt and his fiancée would rather tell you themselves, but it is only three weeks away . . ." Reverend Green was in the very rare position for a man of his calling of not knowing what to say.

"It's okay, Reverend. . . . I heard he'd found a girl after the Ring of Fire hit. I'm very happy for them." In actuality that *was* a fib and she didn't care; she hadn't heard, and it hurt her feelings very much. She had no idea who her son had chosen, was she American or a down-time German girl? She could be the Queen of Sheba for all Pam knew and she tried to keep the resentment from her face.

"Well, that's good." Al's face turned to worry. "Look Pam, I know you're technically one of Simon's flock over at First Methodist but since he's out of town . . . I want you to know that if you ever needed someone to talk to, I'm always available. I'm aware you went through a divorce and that must have been hard on you, and it's certainly never easy for kids, even teenagers like Walt. Let me help, if I can."

Pam wanted to simply walk away from the man but he was so earnest that she couldn't. She nodded, biting her lip. *Later, Pam, deal with this later . . .* With a stern effort she pushed her emotions aside.

"Thank you, Al. I do appreciate it. The truth is my relationship with my son isn't very good, in fact I really can't say we have one right now. I hope that will change some day. Meanwhile I have a lot of work to do, the research institute is keeping me very busy and I'm helping set up a summer nature

studies program with the middle school."

Al smiled, welcoming the change of subject. "Ah, yes, I've heard about that. Grantville is very lucky to have someone so knowledgeable about the natural world!"

"Well, I'm not really. I'm an amateur birdwatcher and I've read a lot of natural history and ecology books. Apparently these days I'm the only person interested in those subjects. I thought it would be a good idea to foster a love of nature with our kids in this new reality of ours, maybe we can raise them to avoid some of the environmental catastrophes we created up-time."

"Good for you, Pam! That's a very noble cause. Truth is, that was the main reason that I stopped you just now. I'd like to ask your help on a certain problem I have, or rather our church has regarding some wildlife."

Pam raised an eyebrow in surprise. "A problem with wildlife?"

"Yes, it seems a certain group of animals has made the church its home. I would very much like to see them removed safely without coming to any harm. Some of the younger fellows offered to go up there and kill them or smoke them out, but they're God's creatures, too, and a massacre certainly didn't seem appropriate in a church building . . ."

"Al, what are you talking about?" Impatience was creeping into Pam's tone.

The reverend gave her a furtive look. "Bats, Pam. In the belfry." The reverend couldn't help but give her a silly grin.

Pam couldn't help but let out a laugh. "Bats in the belfry? I thought I was the only one with that problem."

"I assure you, it is more widespread than one might think. However, in this case it's quite literal. About a year before the Ring of Fire we noticed them flying around the steeple in the evenings. Lately we began noticing the smell . . ."



"Uh oh."

"Yes, it's beginning to be a problem. It seems their *guano* is rather potent. It makes good fertilizer so I've heard but so far no one seems very interested in collecting it. In any event we need to somehow move the little creatures out and prevent them from coming back in. That's when I thought of you, with your knowledge of birds, perhaps—"

"Reverend, bats are *not* birds!"

"Yes, of course, but they *do* fly, and it appears you are the only expert in these matters that we have. Honestly, Pam, I don't know who else to turn to, I can't bear to have the little things killed and the smell is beginning to drive away the faithful. It's wafting right down from the belfry into the hall! Something must be done, particularly with—" He hesitated slightly, trying to gauge if this would help his case or not. "—the wedding coming. Could you please at least look into it for me?"

*The wedding.* Pam's mind fell into a whirl of conflicting thoughts as she took a moment to study the curb and bring things to order. The Baptist Church with Walt and his unknown bride-to-be hanging around, not to mention the possibility of her ex-husband Trent was about the last place she wanted to be. No, she hadn't been told about the wedding and it upset her a lot more than she would like anyone to know. Still, she couldn't help but want his wedding to go well, she loved her son very much even if that had become strangely difficult to show in these last years. And, the reverend was probably right; there wasn't anyone else in town who could be bothered with removing the bats without resorting to violence. Besides, since they were up-time bats they counted on her list of transplanted species she felt needed protecting . . . didn't they? Birds were lovely but not many folks had much love for bats. Still, if they were from West Virginia they should be saved according to her philosophy. She looked back up at the reverend's hopeful face.

"Sure Al, I'll try. I'll need to do some research; I hope the library has something on bats. And if they don't, I'll just do what I always do when I face weird situations our crazy new time throws at me." Reverend Green presented a questioning look.

"Fake it until I get it right." She managed to give him a sardonic grin as she continued on her way across the street.

\* \* \*

"Bats. What have I done to deserve bats?" she whispered under her breath in the silence of the library. The issue of her son's wedding kept intruding into her thoughts and she was having a hard time concentrating on her research, which her heart was not really in anyway. Despite her distraction she had managed to learn that there were two main species of bat found in West Virginia; the poetically named 'big brown bat' and 'little brown bat.' They were both insect eaters and useful in keeping crop pests under control. *Well, looks like you'd be earning your keep. I guess we better save you.* Although they were known as carriers of rabies, the disease usually killed them quickly and when they did rarely pass it to humans it was because the person had foolishly touched a sickly bat with their bare hands. *Important safety tip: Don't touch sickly bats with your bare hands.* Pam briefly stuck her tongue out in disgust at the thought. *Like, who would?*

The one slim bit of wisdom she could find on getting rid of bats that had taken up residence in a building was to do it in the spring or early summer so they would be able to find a new home before winter hibernation—fair enough and good timing. Pam doodled a small cartoon bat in her notebook as she tried to form a plan. It became harder to concentrate as her personal issues pushed their way in. *I haven't spoken more than three sentences with Walt this last year. I know he's avoiding me, some mother I am . . .*

The page swam before her. Walt had always been his father's child. It was pretty hard to compete with "Super-Dad" Trent Dorrman who always made time to play a game of catch or help Walt with his tree houses and plastic models. She tried to stay involved but as Walt got older it became harder—she

couldn't throw a ball to save herself. She had tried to get Walt interested in nature but he found the walks through the countryside like she had taken with her grandmother boring and couldn't wait to get back to his model cars or batting practice. Naturally, the duty of helping Walt with his math and sciences homework fell on her, 'the expert,' but it only served to cast her as the stern taskmistress in Walt's mind. He just didn't share her love of those subjects and her efforts to coach him through to a passing grade were looked upon with resentment. "Walt honey, I know you don't like this but it's something you just have to do!" At the end of each painful session there was her ex-husband waiting with the ball and glove—it wasn't fair, really it wasn't fair.

On the other hand, she knew it wasn't fair to blame her ex-husband. He was what he was and if he had helped drive the wedge between her and Walt, it wasn't intentional. Trent had a way with people and Pam didn't; the end. Old familiar guilt began to take hold of her; she could have made more of an effort to go to Walt's baseball games, she always made it to a few every year but she felt like a stranger there. When his dad cheered him on Walt would grin at wave at him in the stands, when she tried it just made him look embarrassed. In the last few years she had only gone to the biggest game of the year and sat quietly on the bleacher, feeling helpless and unwanted. When the divorce inevitably came, no custody questions were ever asked, it was obvious that teenage Walt would stay with his dad and that she would find another place to dwell.

Pam deeply loved her son despite the growing gap between them and the thought that she couldn't inspire that kind of love in return felt like a black wave swelling over her. The doodled bat was completely submerged now, blurred beneath warm salty water. *God, Pam, pull it together. Someone's going to see you.* Quietly she pulled a handkerchief from her rucksack, dabbing at her hot, moist face with rapid movements. Several high school students passed by on their way to the tables near the window so she hunkered down feigning intense interest in her notes, wiping the tears away from the misshapen drowned doodle. *Bats. What the hell am I going to do about that?* It certainly wasn't a task she'd wanted to take on but she knew that in some ways it was satisfying to her. *That's fine, son of mine, don't invite me to your wedding. Mom will make sure it doesn't stink like bat shit for you, thank me later.* She forced herself back to her planning, the sense of spite a small, cold comfort. Despite her efforts to concentrate, nothing useful presented itself after half an hour. She suddenly felt stifled in the stillness of the room and knew she needed to just *move*. She might as well start by doing something she was good at: Observation. *Time to get Gerbald and check things out.* Walking briskly back to her little house on the edge of town, Pam did her best to shove unpleasant thoughts of her estranged family out of her mind. There was work to do and she was glad for that.

\* \* \*

Pam's hired man and trusted body guard Gerbald was waiting for her on the narrow slab of concrete that served as her front porch, snoozing comfortably in a folding lawn chair with the misshapen brim of his ridiculous floppy felt hat pulled over his eyes.

"Wake up, Gerbald. We have a project."

"Wake up? How could you think I was actually sleeping? I, your ever watchful guardian, made only a show of sleep to hide my vigilance."

Pam raised her eyebrows at Gerbald's increasingly adept English turns of phrase. *Where is he getting that stuff? It must be from all those up-time movies he's become addicted to.*

"That was a very convincing snore then, bravo! Come along 'watchful guardian', no birdwatching today,

we have some work to do. The *Lord's* work." She chuckled at the thought.

"Ah, a tedious task at best. What might the Lord need from us?"

"A flock of bats is living under the roof of the Baptist Church. Reverend Green has chosen me to get rid of them and you are going to help."

"Bats . . . what are bats?"

"They're a small brown animal that can fly."

"Oh! Bats are a kind of bird!"

"No, they're mammals, not birds—oh, you'll see."

"I have come to like birds very much, Pam. Surely this won't be so bad."

"You'll see . . ."

\* \* \*

They arrived at Grantville's Baptist Church around three thirty in the afternoon. It was one of an imposing collection of stately brick churches towering above the main street, an impressive testament to the beauty of "late Victorian neo-Romanesque" architecture. When she was a young girl Pam had, now rather ironically, thought that this might be what Europe looked like. The presence of so many of God's houses on the street had certainly helped convince the seventeenth century natives that the up-timers were not a village of the damned risen from the fiery pit populated with devil worshipping witches and warlocks.

As she and Gerbald followed a path around the side of the beige brick structure to Reverend Green's office, her dismay at her son's secrets returned. *Please don't let any of them be here. I just can't handle it right now.* Anxiety was building within her and she hurried her step. They found the reverend cheerfully tending a rose bush growing near the side door.

"Pam, how wonderful of you to come!" Perhaps seeing the short sword Gerbald wore at his belt, he very slowly and carefully laid the clippers down on the grass.

"Reverend Green, this is my friend and hired man Gerbald who is going to help me out on this."

"A pleasure to meet you, Gerbald. Do call me Al, please." The two shared a gentlemanly handshake and Gerbald favored the reverend with a small and very polite bow. Al led them in through the side door and down a long darkish hall. They entered a narrow circular stairwell that took them up into the regions behind the church's nave. Pam immediately noticed a sharp smell, a putrescent odor that grew stronger as they climbed higher.

"I'm afraid the smell gets quite bad up here, my friends," the reverend apologized. Gerbald's usually impassive face now featured a certain wrinkling of the nose and he had a rather uncomfortable air about him. They reached a small room with a pull-down stairway in the ceiling. Al, with a little help from Gerbald, tugged the steep wooden stairs down into position and tied them in place.

Pam rubbed her chin in thought. "Al, have you been ringing the church bells?"

"Every Sunday!"

"You would think that with their sensitive hearing, bats wouldn't like that."

"Yes, I thought of that, too. At the risk of creating something of a disturbance we rang the bells rather more than usual last Easter, but it didn't seem to bother them any."

"Oh well. Will you be coming up with us then, Al?"

"Ummm, I'm afraid I have some rather pressing business to attend to downstairs, so I'm going to have to

leave you two here," the reverend told them rather unconvincingly.

"That's fine, Reverend. I'm sure we will be quite all right." Pam had figured as much and resisted an eye roll.

Al gave them a rather embarrassed smile. "The stairs lead up into an attic beneath the peaked roof over the main hall. At the far end you will find the adjoining belfry. If you need anything just let me know!" And with that the reverend went hastily down the stairs.

"Oh, we shall!" Pam tried to keep the sarcasm from her voice. The smell had tripled in strength and a hazy cloud of dust was drifting down from the attic's stale and stink-filled recesses. Gerbald now definitely looked queasy.

"Isn't this fun?" she teased Gerbald, who studiously ignored her while he looked longingly back down the stairs after the retreating reverend. *Surely a man who had experienced bloody battlefields can handle a little guano stink.* Pam climbed up the steep stairs, wishing she were just about anywhere else. The feeling increased tenfold when she discovered what a bona fide disaster she had allowed herself to be talked into.

Peering into the gloom of the church's top story, she saw a long narrow room stretching beneath the sharply-peaked roof to the height of the bell tower rising to the side of the far end. The church's attic was a study in dust and droppings; every visible surface was thickly covered in either or, in many cases, a muddy gray combination of both. Dirty brass beams of late afternoon sunlight fell thickly through the open slats in the bell tower's sides to reveal clusters of squirming brown fur clinging to the steeply slanted underside of the roof. *Well, that's one way they got in.* A high pitched squeaking could be heard and the stench was horrific. She pulled a handkerchief out of her rucksack and tied it around her face; it didn't help much.

She turned around to find that Gerbald had not followed her all the way up, only his head and shoulders emerged from the attic's hatch. The big man's face was positively pale and pasty.

"Those are *not birds*, Pam!" Gerbald hissed.

"I told you they weren't birds, Gerbald."

"*Ja*, but you didn't say they were *Fledermaus!*"



Pam gave him a surprised look. Gerbald rarely slipped into his native tongue with her, his pride in his English was too great. It only happened when he was under stress. "Well, I didn't know what they're called in German . . . are you all right Gerbald?"

"*I . . . don't like . . . bats.*" A plaintive whisper.

"I don't think anyone really does much, but as the Reverend, who is notably *not* up here with us, says: 'They're God's creatures, too.' So we have to be gentle. No *katzbalger*." Gerbald's pride and joy was the dangerous little *katzbalger* short sword he wore at his belt. "The trick is, how do we get them out of

here?" Pam bit her lower lip in determination as she moved slowly across the creaking floorboards. Stepping gingerly around a pile of debris, the dust enshrouded cardboard props of some circa 1950s Christmas production, she approached a cluster of trembling bats.

"Oh, great. These must be the *big* brown type. Gerbald, come give me a hand." She looked back to see that he was still barely emerging from the hatchway, in fact he might have crept back down a step.

"Gerbald!" she called with a touch of annoyance. The former professional soldier breathed out a puff of resigned air and climbed the rest of the way into the attic. There was plenty of standing room in the center but he still stooped, a study in apprehension. Pam shook her head in exasperation.

"Come on, pal-o-mine, pull yourself together. The sooner we get this done the sooner we are outta here. I'll even pay for all your beer at the Gardens tonight." Gerbald gave an unconvinced nod. She had never seen him act like this and the truth was it was beginning to freak her out; his obvious fear was shaking her own confidence greatly.

"Yes, Pam. But what do we do?" There was none of the usual steel in those tones.

"Ummm. . . ." Actually Pam still had no idea what they were going to do. *Let's just get this over with and get out of this church before the damn wedding party shows up!* "Well, let's see if we can shoo them out the slats up there." She pointed at the belfry. "Here, take this." Pam indicated a cardboard camel from the nativity play which Gerbald picked up to study with an exceedingly unhappy expression. Pam chose a rather clumsily executed sheep that still had old cotton balls glued haphazardly to its front. Holding the meter long prop in front of her, Pam took a menacing step toward the bats. "BA-A-A-A!" she cried loudly in her best sheep bleat. The bats didn't move. Gerbald looked on with a pathetic mixture of horror and wonder.

"Well, you try it now," Pam urged him impatiently.

"I don't know what sound this creature makes." he mumbled, looking helplessly down at his cardboard one-hump camel.

"Oh, for Chrissakes—oops! Sorry!" She looked nervously up toward the ceiling. *Just what I need, pissing off God.* Gerbald followed her gaze with an expression of pleading. He was by no means a religious man but any help would be welcome at this point.

"Just say anything, the bats don't know what the hell sound a camel makes, either. Oh, I did it again, ahhh shi—" She managed to stop herself this time before further blaspheming under the Lord's own roof. Gerbald, seeing there was nothing for it but to try took a very small step forward, lifted his camel up to chest height and said in a near whisper: "Boo."

"Oh, yeah. *That* scared them. Here, watch this." Pam felt a wave of frustration swelling in her, she had to *do* something and *now!* She held her sheep out in front of her as if it were a knight's shield and stomped aggressively toward the bats. "ARRRRRRRRRRR!" she shouted at the top of her lungs, waving the sheep crazily at the bats. "CLEAR OFF, YOU STINKING BASTARDS!!!" The bats began to make quick nervous movements as she swung the sign nearer to them.

"Pam, please, don't!" Gerbald's plea was barely a whimper, as if he were trying to call out for help in a terrible nightmare but had no voice.

"YARRRR, YOU BUG EATING SHITS, GIT!" This time the cardboard sheep brushed against the bats, knocking several from their perch. All holy hell broke loose.

Pam and Gerbald were swiftly surrounded by a tornado of bats, a swooping, flapping, screeching maelstrom of leather wings and flashing teeth. Gerbald let out a hoarse scream and fell backwards in a

heavy crash, flattening the cardboard manger beneath his bulk. He had maintained his grip on the camel which he now held tightly over his face to protect it from the whirl of brown fur. Pam stood for a moment vainly waving her sheep around in what she hoped was the direction of the open slats.

"SHOO! Come on, get out! ARRRGH, ohmygod!" One of the bats had landed on her back and she could feel the little claws digging into her sweatshirt as it made its way up toward her neck. "AAAAA, get off me, get off me!" She performed a crazy little spinning jig while trying to use the cardboard sheep to brush the bat off her back. Another one joined it. Time to run.

"Let's get the hell out of here!" she screeched over the flapping din. Gerbald was already crawling toward the hatch, he had put the broken cardboard manger over his head and upper back so that he looked like some kind of mutant tortoise. He went down head first with an awful series of thumps; leaving the camel lodged in the opening so that Pam found the path to safety blocked by its tan-painted rear end. She gave it a firm kick so that it fell down to add itself to the heap of debris at the stair bottom that included Gerbald somewhere within its wreckage. She started down the stairs and realized she still had two bats on her back. With a vengeful swipe of the sheep over her shoulder Pam managed to dislodge her creepy crawly hitchhikers and then threw the prop after them as they flapped away to join the swirling chaos made by their brethren above. Once on the ground she quickly untied the rope and sent the stairs swinging with a loud creak on its spring back into place, shutting the bats behind it. Pam began to curse, loudly.

"Jesus wept, what the *hell* was I—oh, hi Reverend."

Al had heard the racket from below and hurried up the stairs to see if his bat removal team was all right. He gave Pam a raised eyebrow and a grin. "Don't worry, I've heard worse. Are you two all right? What happened?!" He saw movement under the pile of broken cardboard and moved to help Gerbald extricate himself. Upon finding that the big man was shaken but unhurt, he listened to Pam tell the story. When she finished, the reverend shook his head regretfully.

"Oh my, I feel terrible. I didn't realize that you were going to try to drive the bats out right now; I thought you were just having a look at them! You see, most of them leave on their own every night to feed."

Pam blinked at him slowly, a chagrined expression growing on her dusty face. "I should have known that. *Everyone* knows that. Why am I so *stupid*?" She looked at Gerbald who was pouting beneath his floppy hat—no support was going to come from that quarter.

"Now, now dear, you most certainly are not stupid! You told me yourself that birds are your forte. I just thought that with your love of animals maybe you would be more . . ." He paused to look about at the mess they had brought down the stairs with them. ". . . gentle. It's no bother really. I'm sure I can get someone else."

"No, that's all right. I want to try again. I'll come back after dark when there aren't as many. I'm going to need some stuff though; a ladder, some fine mesh to tack up over the open slots of the belfry—do you think you can get that?"

"I have a certain amount of pull amongst my flock, Pam. I'll get the word out and you'll get what you need. You two look bushed. How about tomorrow night?"

"That's fine. We'll see you tomorrow after sunset."

\* \* \*

The next evening Pam stood at the church's side door waiting for Gerbald. He had been very quiet the

night before and had even declined to take her up on the beer offer. *Who would have thought a guy like that would have a phobia?* Pam grinned a little guiltily at the chink she had found in the mighty Gerbald's armor. The thought was a welcome distraction from the increasingly bothersome worry that her son Walt would show up with this fiancée he hadn't bothered to bring by his own mother and, worse yet, the possibility of her ex-husband with them. It was a situation that she just wanted to have go away, and chided herself for slipping into her pre-Ring of Fire hide from the world mentality.

She jumped as she heard someone approaching, hopefully Gerbald on schedule. To her surprise it was Gerbald's wife Dore coming around the corner carrying a variety of mops, brooms and brushes.

"Dore! What are you doing here?"

"I am here to work," the doughty German announced in her usual curt, business-like tones. Pam looked behind her but Gerbald didn't appear.

"Where's Gerbald?"

Dore let loose a tremendous huff of disgust, obviously regarding the subject of the question. "He is not coming. He is sick." She gave Pam a very telling look.

"Oooohhhh, I see. Well, uh, I hope he's all right."

"Not to worry, dearest Pam. He is sick in a place that he has little use for." With a wicked grin, she tapped her forehead. The two of them shared a brief laugh at Gerbald's bat-fearing expense before going to look for the reverend.

\* \* \*

Dore had no compunction against facing the bats, she advanced into the attic spaces with cool determination, broom held firmly at ready like a soldier's pike axe in one hand, kerosene lantern in the other. There was only one lonely light bulb hanging over the hatch door and its forty watt glow didn't push very far into the chaos.

"I will clean," she announced stoically after looking the fantastic mess over.

"That's a good idea, Dore. It will help to have this place orderly so I can find all their hidey holes." Pam had brought a personal treasure, a wall socket rechargeable flashlight—as long as the bulb lasted she had light on demand. She began methodically searching the unobstructed sections of wall first. Most of the bats had indeed left to feed on the night's insects and she and Dore moved carefully so as not to startle the remaining small clusters. *We don't want to see that again!* She suppressed a shudder. There were a surprising number of small openings leading out to the open air in the very old building, rotted out knots in the pine boards and crumbled away chunks of masonry where the top of the brick walls met the wood above. Pam marked each one she found with a red crayon so they would be easy to find when it was time to start closing the gaps.

The Reverend Green's voice called up through the open hatch. "Hello ladies! I have a volunteer for you! I'm sending her up!"

Pam and Dore looked at each other with surprise. Who would be crazy enough to offer to help them bring order to this reeking disaster area?

New-penny red hair and a smiling freckled face framed by two long pigtails appeared at the top of the steep stairs. "Hi! I'm Crystal!" A tall slender girl with wide shoulders and long legs emerged from the hatchway, dressed in denim bib overalls and a red and black checkered cotton shirt. She was an American girl all right, athletic and emanating an aura of confidence. Pam and Dore gave each other a small shrug and walked over to greet her.

"Hi Crystal, I'm Pam. This is my friend Dore."

Crystal shook their already dust-covered hands readily, obviously unconcerned with the dirt. "Nice to meet you both. The Reverend told me you were up here trying to get rid of these bats, what can I do to help?"

Pam gave her a brief appraising look; she seemed made of tough stuff. "Wow, that's really nice of you! I'm afraid it's a terrible mess up here . . ." Pam paused to see if the young woman would flinch, but the newcomer's copper flecked bright brown eyes met hers with a sure steadiness. *All righty then, you we can use!*

"Well, to start with you could help Dore move some of the old furniture and junk away from the walls. We need to find every place the bats might be able to crawl in and then we can start sealing them up." Pam fished into her jacket pocket for an extra crayon and handed Crystal a purple one. "If you find an opening, just mark it clearly with this."

Crystal smiled brightly. "Sure thing, Pam! Okay, Dore, where shall we start?"

The older German woman gave the girl a studying look up and down her entire length, approval pending. "Come with me, we start over there." Dore led Crystal to a decaying cabinet, its once polished surface now a modern art splatter of bat droppings and mold. They arranged themselves on either side, then slowly slid the heavy piece away from the wall. Pam gave them a pleased tilt of her head and went back to her own work.

Crystal proved to be a hard worker. She didn't flinch at the dust and guano and her athletic build was a big help in bringing order to the many decades worth of junk. Pam was glad to have her. The sooner they got this over with, the sooner she could disappear into the woods as far away from the Baptist Church and June weddings as she could get. Maybe Norway . . .

After an hour of dirty hard work the three of them paused for a break, sitting on a clean patch of floor around the hatchway.

"Pam, did you grow up in Grantville?" Crystal asked.

"Mostly. I spent some summers with my grandma in Fairmont. How about you?" It was a small town but Pam could hardly claim to know everybody, especially the younger generations. Walt had rarely brought friends home; he had preferred to be "out with the guys." Pam started to wonder why that was but made a mental effort to push the thought aside for now.

"I'm from Fairmont. My folks built a place pretty close to Grantville while I was in high school but by then I could drive myself to school. I used to come to Grantville to visit my aunt, Donna May Blocker, pretty often. I live with her now."

"Oh, I see." The subject of the Ring of Fire was a touchy one in general, especially with those out-of-towners who had just happened to be there and were swept up in the event. It had socially become poor form to ask direct questions about it, but apparently Crystal wasn't the type to have such reservations as she volunteered her story.

"I was working as a flagger with a state road crew just outside of town. I decided to go into Grantville to get some fries instead of going home for lunch—what a decision *that* was." The girl smiled ruefully.

"So, here I am in the year 1634. Crazy, huh?" Pam nodded in full agreement.

"Do you have family here in Grantville, Pam?"

The question took her by surprise, although it shouldn't have. "I'm divorced," she answered flatly, her

tone making it clear that further information was not forthcoming.

Crystal got the hint and didn't probe further. She turned her attention to Dore. "Dore, what do you think of these wacko Americans from the future landing in the middle of your country?"

Dore, who no one had ever bothered to ask such a question, took a moment to think. "It is God's will." Dore was a devout Lutheran who had the good sense to practice her faith quietly in the hodgepodge of religious and non-religious that made up the growing population of Grantville. "It is good Americans come, you teach us much. No war here now. My husband and I, we have good life, thanks to our dear Pam here." The dour expression that was Dore's usual front to the world was replaced briefly with a golden gaze of sisterly love to Pam, who blushed. "We think of her as a gift from God." This caused Crystal to look approvingly at Pam who had inspired such loyalty in her down-time friends.

"Well . . ." Pam tried to hide her embarrassment at the praise. "I wouldn't have made it without Dore and Gerbald. They've helped me deal with my new life here, if it wasn't for them I think I really would have gone crazy. And speaking of crazy—" She gestured at the mess they still faced, using it to deflect the course of a discussion that was getting way too personal for her "—we still have a lot of work to do."

With a cheerful groan the three of them got back on their feet. Crystal proved to be tireless, which certainly won Dore's respect; Pam was amazed to see that Dore was even *laughing* at the little jokes and funny faces Crystal made during the course of the tedious task. Pam found herself taking a liking to this sunny young person, a fellow castaway in space-time. The hours went by quickly.

"Well, ladies, it's getting late." Pam announced at last. We've marked all the entrances, let's save the patching for tomorrow. I have an idea for a one-way exit I want to tinker with that should allow any stragglers to leave." She turned to Crystal. "Thanks for all the great help, Crystal. We were really glad to have you! Tomorrow—"

"I'll be here, Pam. My pleasure. It's nice to have something positive to do, Reverend Green really appreciates it—and once this godawful smell is gone, you two are going to have a lot of Baptist friends!" They laughed, and the three of them made their way merrily down to the street, proud of the hard work they had accomplished. After saying their good nights, Pam walked home feeling pretty up. It was funny how even the worst things could come around to having some good outcomes.

\* \* \*

Pam walked home from the research institute the next day in good spirits. She had managed to concentrate on her lab work and was now ready to focus on the task ahead of her—no time for unwelcome personal matters. As she came up the walk she found Gerbald sitting on the front porch in a glum slouch.

"Hey, Gerbald."

"Hello, Pam." There was a long painful pause as the large man searched for words. "I hope you do not think very badly of me."

"Of course I don't, Gerbald." Pam sat down on the lip of the concrete porch.

"You know I would face any that would harm you—and kill them swiftly."

"I know you would, Gerbald. I know you were a soldier and you are very brave. It's just the bats, right?"

"Bats." He spoke the word as if it were a curse. Pam waited.

"When I was a small boy we lived on a farm. The bats, they were in the barn, in the high places. One time I had to go up to where they were to get something for my father . . . I tripped in the dark and fell

against them . . . it was much the same as we, but some bit me and I became sick; long time. I was lucky, because I still live." In an age before vaccines the threat of a bat bite was mortal. If not rabies they certainly might carry other dangerous bugs, especially in these times. Pam realized how very incautious she had been and felt all the more foolish. Gerbald was afraid of bats because they had almost killed him once.

"I understand, Gerbald. I'm the one who should be sorry for dragging you up there, and then acting like a lunatic. I am *really* sorry. I've just had a lot on my mind and I wasn't thinking straight at all that day."

"It is not my place, but perhaps the matter of your son?" Gerbald's face was filled with sincere concern. Pam fought back the urge to give an angry conversation stopping retort. "Yes. It's been on my mind. We haven't talked in almost a year. He's getting married soon, I don't even know who she is." Gerbald shook his head slowly in understanding.

"It's something I need to work out, I know. It's just been hard, our whole world has changed."

"I cannot know how that must be for you, Pam. I try to think; what if I woke up in the time of the Christ? At least there was need for swordsmen in those days . . . What if I went to your future? I, a simple man, would not understand your ways, your sciences. I would be lost. I could only hope to make friends such as you."

Pam smiled. "Well, if it wasn't for you and Dore, I'd be the lost one."

This caused Gerbald to blush ever so slightly in the shade of his monstrous hat. He stood up in order to reach into one of his sage green coat's many voluminous pockets. "I've made something for the bats." he announced with pride. He handed Pam a square wooden tube about 4 inches in diameter and just over a foot long. One end had a square of light wire mesh, which was slightly larger than the opening, on a hinge.

Pam laughed. "You beat me to it! I was going to cobble up something like this myself." Gerbald was very much an expert handyman; his day job included a wide variety of carpentry work. Still, this level of creativity surprised her. *Why should it? Gerbald is every bit as smart as any up-timer I've ever met.*

"I spent many years trapping small animals for food—this is not so different. You see how it works?"

"Yes. We place this through one of their entrances and then seal around it. The bats inside can go out—" She stuck her hand into the device and out through the mesh gate. "—but the bats outside can't come back in!" Her other hand pushed against the closed mesh and then flapped away in bat pantomime. Gerbald nodded, a bit of pride returning.

"You know, Gerbald, I think you might do just fine up in the twenty-first century!"

"I do rather like the movies. It would be good to see all of Clint Eastwood's films." His eyes took on a wistful quality. "This is my sword, Clyde." In a hoarse imitation of his Hollywood hero, Gerbald was a clever mimic. "Perhaps I could find work in such movies. It seems they would have need of able fighting men, especially comely ones." He struck a heroic stance.

"I think you would make a great plumber." Dore had appeared in the front door carrying a plate of cheese and sausage sandwiches. "The American cowboys wear a decent hat. You need not apply." Dore commented coldly as she bestowed a baleful gaze upon Gerbald's constant accoutrement. Dore and Gerbald's exceedingly ridiculous floppy hat were matched in a never-ending battle of wills, with Dore prevailing only at the sanctity of the dinner table.

"You know, Gerbald, if we made a little opening here—" Pam pointed at a spot in the dirty mustard felt

above the misshapen brim. "—our bats could find a cozy new home." Gerbald gave her an injured look. "Ha! There is only room for one filthy animal in there!" Dore proclaimed righteously. Accepting defeat with a much maligned roll of the eyes, Gerbald took solace in a sandwich, devouring it in large carnivorous bites.

\* \* \*

Neither Dore nor Pam made any comment when Gerbald trooped along behind them carrying his day job's carpentry tools and his one way bat hatch. Arriving at the Baptist Church, Pam dawdled along beside him for a moment to whisper, "You're sure you want to go up there with us? You don't have anything to prove to me, I know you're a brave guy."

This brought a wan smile from the ex-soldier. "I am all right now, Pam. I can face my childhood fears. With my carpentry skills I can close all the openings much more quickly than you and Dore could. I want to help."

Pam nodded and gave him a companionable clap on the arm. "Glad to have you as always."

Pam was pleased to find Crystal at the side door and introduced him to Gerbald who responded with a well-practiced West Virginia drawl and an overly gracious tip of the hat, "Pleased to meet you, ma'am," followed by a movie star quality winning smile.

Crystal's penny bright eyes widened. "Nice to meet you, too, Mister Gerbil." She turned to Pam who was trying to hide a mischievous grin at the young woman's mispronunciation. "You sure this guy's a down-timer?" Gerbald had stuck his thumbs in the jeans that had replaced breeches in his daily uniform and leaned smiling against the wall as slick as any up-time gambling man.

"We aren't sure just what he is," Pam replied with false gravity.

"I can tell you sure what he will *not* be if he continues such foolishness—*alive!*" Dore added, with a mighty scowl at her husband's comically flirtatious behavior. Crystal and Pam giggled as Dore gave the grinning Gerbald a firm push toward the stairs.

\* \* \*

The evening's work went by quickly. Gerbald, with only a few minor shudders at the remaining bats, closed the openings with the various materials the reverend had managed to scrounge up. He chose a fairly large section of crumbled masonry for his bat escape hatch, widening the opening some so it would fit through and then carefully sealing around it. Meanwhile Pam, Dore and Crystal finished cleaning up the years of bat guano. With the end in sight, they worked fast with little small talk. Ridding the belfry of bats had proven to be a particularly long stinky job; it would be very good to have it over with.

At last they stopped to survey their accomplishments. The floorboards of the church's attic space were scrubbed clean and shiny as were the walls where they could reach, the years of accumulated junk were organized and arranged neatly, the many openings in the walls had been patched and the guano stench had greatly receded. The few remaining bats that had not gone out to feed were huddled high up in the belfry. Pam figured that within a few days they would find their way out through Gerbald's contraption and never be able to return again.

"I wonder where they will go?" Pam mused.

"There's some caves and unused mines around town my aunt told me," Crystal offered. "Maybe they'll hole up in one of those?"

"That would be a good place for them. You know, I never thought much about bats before. They aren't

very well liked but they aren't bad critters by any means. They eat a lot of harmful insects and they pretty much mind their own business. They're even kind of cute in a way."

"Yeah, kind of . . ." Crystal didn't seem very convinced. Dore declined comment and Gerbald made an eloquently disgusted face at Pam which made Crystal laugh.

"Let's get the hell out of here!" Crystal said, with feeling. It was almost a race to see who got to the hatchway stairs first.

It was around eight p.m. as they left the building through the side door. Reverend Green had hung around waiting for them and waved through the window that he would be out to see them off. Gerbald and Dore were occupied with arranging their various cleaning and carpentry implements for the walk home.

Pam turned to Crystal. "Well, Crystal, it was really nice to meet you. You really helped a lot!"

"Thanks, Pam. It's good to meet you and your friends, too. You know, I've been wanting to tell you that I think it's really cool that you have close friends who are down-timers. It seems like a lot of up-timers kinda keep them at arm's length. I've made a few really good German friends since I got here and I'm glad I'm not the only one."

Pam felt strangely pleased at the young woman's approval. Crystal had made a good point; there was still a long way to go before the two populations would really meld into a new America. She had never considered her that her friendship with Dore and Gerbald might be seen as a good example for anyone.

"Wow, I never really thought of it that way, Crystal. Thank you for saying that, it really makes me feel good. Say, I know we are a bunch of old fogies but why don't you come by for dinner sometime? On Fridays Dore serves up quite a feast and I could use some help chowing it all down!"

"Sure, that would be fun! If there's food involved you can count on me!"

Pam smiled, a sense of warmth filling her. It had been a long time since she had felt any connection to a fellow time traveler. Having such a bright young person visit would be really wonderful, she knew that childless Gerbald and Dore would be tickled. "We have a deal then. Do you need us to walk you home?"

"No, my fiancé will be here any moment to meet me. Hang out a couple and I'll introduce you. Say, you should come to our wedding! I'll make sure you get an invite!"

Pam heard the side door swing open and the reverend greeting Dore and Gerbald. At the same time a shadow stepped around the red brick corner of the church and came up the walk. The silhouette was very familiar, although maybe an inch taller than she might have expected. *Oh my. He's here.*

Pam's son stepped into the light with a rather surprised look on his face.

"Walt." Pam said in a tone of neutral greeting.

"Mom." Walt returned the greeting in the same neutral tone.

"Walt!?" Crystal turned to her betrothed in astonishment.

"Walt . . ." Gerbald and Dore both murmured at once, having at last set eyes on their friend's always-absent son.

Crystal looked back at Pam with understanding dawning in her eyes. "Mom?" Her eyes were filled with a sudden wonder.

"Crystal . . ." Pam said hesitantly, feeling stunned; a storm of questions roiled in the back of her mind but her mouth was unable to shape them into words. Pam watched fearfully for her new found friend to reject her, God only knew what Walt had said about his hard-case pain-in-the-neck of a mother. The side

door to the church creaked in the shocked silence and all eyes fell on the man who stood frozen there, obviously caught between entering the situation or fleeing back inside.

"Reverend Green?" Pam and Crystal said at the same time, sharing a somewhat accusatory tone.

"Oh, hi! I see everyone has met each other." An unmistakably guilty look was on the reverend's face, which was rapidly changing to worry as everyone stared at him. "Aw, heck. I was just doing my job, folks. If a man of the cloth can't meddle around trying to help folks then what good is he?" Everyone stood in silence for a moment. Walt was making a careful study of the ground.

Crystal turned to Pam. "Wait here, please Pam!" Crystal implored her.

Pam nodded shyly in consent. The young woman turned to her fiancé and began shoving him back down the path and around the building's corner. He wasn't that much taller than her and wore the slumped shoulders of someone who knew that resistance was futile.

As they went, Pam heard Crystal hiss in an audible whisper. "Come here! We are going to talk about your mom!" Pam stood rooted to the ground, so many emotions had hit her at once that they canceled each other out, leaving behind a gray fuzz of confusion.

Reverend Green approached her cautiously, well aware of Gerbald and Dore's carefully studying this *agent provocateur* with cold eyes. It was obvious that causing any kind of distress to Pam would be an extremely bad idea with those two around. "Pam, look, I'm sorry if this is terribly awkward for you. I was going to ask you to help with the bats even before the wedding was scheduled. I didn't know at the time you and your son weren't speaking. Then, Crystal asked if she could help and I sent her up to you. I didn't tell either of you who the other was because I thought it would be better for you two to get to know each other on your own before Walt entered the picture. She's such a wonderful young woman, I was sure she could make a bridge between you and your son." The man looked at the ground. "I hope I'm not wrong." Pam nodded her understanding. "It's okay, Al. It's a small town, I couldn't hide forever. You meant well, of course. I'm glad I met her, I really like her, too. I hope—" She didn't finish the sentence, her voice trailing away into silence. She didn't know what she hoped for.

She looked over to where Gerbald and Dore stood poised to intervene. She gave them a faint smile and tilt of the head. *Stand down, you two. I'm all right.* Her fierce and faithful friends relaxed somewhat but remained on guard, Dore had her arms crossed with her "I will not have more of this funny business" scowl directed at the meddling reverend while Gerbald decided it would be a fine time to polish his *katzbalger*.

Around the corner a vehemently whispered conversation seemed to be winding down. Crystal came back into view with a satisfied look on her face as Walt trailed along behind looking thoroughly chastised. He took his place at her side before the group as Crystal waited for him with a regal bearing.

"Pam," Crystal announced in clear, sure tones, "Walt has something he wants to say to you. Walt." The last was a command, no mistaking it.

"Um, Mom . . . I just wanted to say I'm sorry for, uhh, not coming around much . . . lately." He kept his eyes to the ground. Crystal saw this and administered what appeared to be a variation of the Vulcan nerve pinch to his shoulder, which caused him to quickly straighten up and look his mother in the eye. Pam was impressed by the girl's efficient methods.

Walt's greenish eyes met her gray ones for the first time in many, many months. Pam gazed back steadily.

"I really am sorry. I was going to invite you to the wedding sooner but I've been, uhh, busy." The young

man paused for a long moment until Crystal appeared to be about to apply her special touch to his shoulder again. "Anyway, we would like you to come." A warning look came from Crystal. "*I'd like you to come. Please.*" Pam looked at Walt's somber face and Crystal's earnest one. She swallowed a sigh at the methods and accepted the results graciously. "Sure Walt, I'll come. You've done well to find a great girl like Crystal hon, I'm proud of you." This had the effect of her son giving her a slim but sincere smile. *It's a good start. A very good start.*

Crystal launched herself at Pam, clamping onto her in a powerful hug. "Mom!" The girl's grip was tight and full of love.

Pam's eyes were misting. *Oh dammit, I'm going to cry again.* She didn't try to stop the flow. Pam whispered into the girl's chamomile scented copper red hair: "I'm glad it's you, Crystal."

Crystal replied "Me, too! You don't mind if I call you 'Mom,' do you?"

"No, please do."

"I lost my real mom in the Ring of Fire. I miss her a lot. She would be glad that I have people like you and Walt in my life."

"I'm glad, too, honey." After a while the two let go, happy tears wiped on dirty sleeves leaving dusty streaks on two bright faces. Everyone stood quietly for a long moment absorbing what had just come to pass.

Finally it was Dore who broke the silence. "Time to eat! Everyone will come," Dore announced in her patented "you will not question me" tones. "I have a dinner ready, there is plenty for all." Dore cast an eye at the reverend who realized to his relief that he had been forgiven now that Pam was happy. "You, too, Pastor. You are welcome. Honor us, please."

And with that they all trooped off to Pam's house. They ate a bit quietly but a healing had begun and Walt even hugged his mother briefly as he and Crystal left.

*Things are going to be better from now on,* Pam told herself as she shut the door behind them.

\* \* \*

A few weeks later, Pam sat in a lawn chair in the little park area behind the church where the reception was taking place. It was dusk now and she watched the bats spiraling through the dark purple sky, wheeling and turning in search of insects. Pam saw for the first time how truly graceful the creatures were. They were far more maneuverable than her beloved birds. Watching them move, she realized that they had their own kind of beauty and a deep sense of satisfaction that she had been able to send them on their way with out harm filled her.

She looked over to where Walt and Crystal were dancing under a tulip tree, laughing and enjoying the start of their new life together. Things were still cool between her and her son but a thaw was happening. Pam smiled, turning back to the bats as she sipped a glass of sweet white wine. She found it amusing that the much-maligned little beasties had played such a positive role in this wedding, helping reunite a family. *"God's creatures," indeed.*

A voice interrupted her reverie. It was Mary Ellen Jones, the wife of the Methodist pastor and a pastor herself. She was currently manning the pulpit while her husband Simon was down in Italy.

"Pam? Hi, do you remember me?" The woman approached her politely.

"Sure, hi, Mary Ellen. How are you?"

"Oh, I'm fine! Congratulations, I'm so happy your son has found such a nice girl." They looked over to

where Crystal was now dipping Walt in an increasingly erratic dance that was beginning to show some unsubtle sexual overtones.

Pam laughed aloud as she saw Mary Ellen's face pale ever so slightly. "I am, too. She's a firecracker all right, I'm proud of them both."

"Indeed! Well, anyway, I have something I've been meaning to ask you . . ."

Pam kept her smile firmly in place; it was well known that she had allowed her Methodist affiliation to lapse and had not been seen in the church in a good many years, but Mary Ellen was most likely here to make a last grab for her soul before she sank into agnosticism permanently or, worse yet, became a Baptist. Pam braced herself for the invite to Methodist Lady's Tea.

"Sure, shoot!" Pam answered a bit playfully. She was in as high a mood as she'd been in years.

"Great! Well, I've been talking to Reverend Green and he says that the *Baptist* Church had the same problem as we do . . ." A subtle influence was intoned on the competition. Pam felt her very good mood go flapping away into the gathering gloom. Mary Ellen continued on; "Well, he said you were a real cracker jack on the subject and would know just what to do. It seems we now have bats in *our* belfry . . ."

\* \* \*

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# A Matter of Unehrllichkeit

Written by Kim Mackey

The breeze along the Rhine was beginning to freshen again when Philipp Hainhofer glanced once more towards the gates of Cologne. *Where are you Georg? It's been over an hour!*



His youngest daughter, Sophie, noticed his look. "He's probably in a beer tavern somewhere with Magnus," Sophie said, nodding her blonde head towards the walls of Cologne. "You really should have sent me with him, Father."

"Too bad you didn't mention that at the time, Sophie," Augusta, his next eldest daughter, said. "Advice comes too late when a thing is done."

Sophie's blue eyes narrowed. "Is that a challenge, my dear sister?" Sophie thought for a moment. "Good advice never comes too late."

Philipp Hainhofer sighed. As a way to get his sons and daughters to read and learn other languages, he had often practiced what he called "the proverb game" with them. His eldest daughters, Barbara and Judith, had enjoyed it so much that he had continued the game with his younger children as well. But with them, especially with Sophie and Augusta, it had turned more into a competitive struggle than a learning game. Sophie had the better memory, but Augusta had inherited both her mother's (god rest her soul) ability to get by with little sleep and her father's knack for languages. While Sophie could often respond in Latin, English or French, Augusta could often reply in Spanish, Dutch, Italian and Hebrew as well.

"Now daughters, please . . ."

Augusta smiled sweetly. "This won't take long, Papa, I promise." She looked at Sophie. "*Non dare consigli a chi non li chiede*. Would you like a translation, dear?"

Sophie shook her head. "Italian, of course."

Augusta nodded. "You've been studying. Good."

Sophie glared. "I'm not a complete ignoramus. Nor are you . . ."

A powerful gust of wind came from the north and all three of the Hainhofers grabbed their hats or caps to keep them from blowing away. Sophie's eyes widened and her hand flew to her mouth to stifle a scream as the crane transporting the last, large crate from their ship swayed dangerously.

All three watched anxiously. *Please*, thought Philipp, *not the writing desk too!* The first crate, which contained the small curiosity cabinet for Rentmeister Cronenburg, had crashed hard on the dock and Philipp knew that he would have to have repairs done to it before delivery. But the writing desk for Hardenrat would be much harder to repair if it broke, given its unique construction.

For several seconds the Hardenrat desk continued to sway in its net, and then the stevedores got it under control.

"That was fortunate," Augusta said. "And look, here comes Georg. That is the fastest I've seen him move in years." Like Augusta, Georg Hainhofer had inherited Philipp's tendency towards plumpness.

A trickle of apprehension ran down Philipp's spine. Why was Georg running?

Georg Hainhofer stopped in front of his father, gasping for breath.

"What's wrong, Georg?" Philipp asked. "Where is Magnus?"

Georg shook his head. "I . . . couldn't . . . find . . . him." He took a deep breath. "So I went to the city council house. He's been arrested! At the request of his own father!"

\* \* \*

The next morning it took almost an hour for Philipp and Augusta Hainhofer to walk from the Inn of the Golden Grape in the parish of Saint Kunibert to the intersection of Schildergasse and High Street. To Augusta, Cologne seemed much like Augsburg except for the black slate roofs and more level streets. Like Augsburg, artisans and shoppers filled the streets and women washed clothes near bridges across the streams. But unlike Augsburg, the Catholic cathedral and churches dominated the skylines.

"How many parishes are there again father? Twenty?"

"Nineteen. But Cologne is also a destination for pilgrims. There are over three hundred religious institutions if you count all of the convents, stifts, hospitals, cloisters and abbeys in addition to the typical parish churches."

"But no Lutheran?"

Hainhofer grimaced. "No. Or at least, none that are publicly acknowledged. There are 'secret' congregations of Lutherans and Calvinists in Cave Lane, however. But that will probably change now that Cologne has negotiated an agreement with Gustav Adolph and his allies. According to Hardenrat, the next election in June should see the Pragmatists take control of the city council." Philipp stopped and pointed across the street. "Here we are. Noah's Ark."

Augusta's eyes widened. The store known as Noah's Ark took up two entire floors of the building on the southeast corner of Schildergasse and High.

"It's huge!"

Her father laughed. "Indeed. Herr Fetzer started it originally as a supply house for apothecaries and physicians, but branched out early in the century to indulge his own interest in curiosities. He was able to take advantage of Cologne's location and trade connections to provide items for all the naturalists and curiosity seekers in Germany, including my own cabinets. I've purchased many an extravagance from him."

As they entered the shop Augusta shook her head in amazement. She had been involved with her father's affairs for almost five years, including assisting him with the *Kunstschrank* that had been presented to Gustavus Adolphus in Magdeburg in December 1632. Gustavus Adolphus had been delighted to receive the curiosity cabinet and had given her father a substantial bonus. But never had she seen such a wide variety of strange and unusual artifacts as she saw in Noah's Ark. The lower shelves in the shop were filled with shells, porcelain, and aromatic woods. Overhead dried and stuffed fish and mammals hung from the rafters while birds of every color and description lined the top shelf.

"This is truly splendid, Father!"



Philipp smiled. "It's as nothing compared to the *Kunstskammer* in Munich. Perhaps someday I can show it to you. It is truly a magnificent chamber of arts." He frowned. "If Maximilian of Bavaria can ever be convinced to deal with me again. He's not feeling particularly friendly towards those who seek the favor of Gustavus Adolphus."

Augusta pointed to a shelf off to her left. "And what is that? And why does it seem familiar?"

Philipp chuckled as he and Augusta approached the object. The stuffed animal seemed wildly improbable. There were seven cat-like heads on long scaled necks connected to a scaled body with large claws underneath. "A hydra. You've probably seen one in the broadsheet I have of Durer's 'Whore of Babylon.'"

"Philipp! Is that really you? Have you come to drop off a copy of the Hainhofer Report in person? I always look forward to your insights into European politics." A older, white-haired man with sharp blue eyes and a large smile approached them from the darker recesses of the shop.

Philipp clasped the man's arm. "Unfortunately not, Paul. We are just stopping over in Cologne to deliver some cabinets and desks on our way to Essen. I've been offered a position with Louis de Geer. This is my daughter, Augusta."

Paul smiled as Augusta curtsied. "A pleasure to meet you, Augusta."

"And for me as well, Herr Fetzer. Your shop is wonderful."

Paul beamed. "It is, isn't it? So is this just a social visit then? Or have you brought me some more of those interesting artifacts you sent me from Grantville?"

Philipp shook his head and then peered into the face of Paul Fetzer intently. "We were also delivering my son, Georg, to serve his time as a journeyman clockmaker with Magnus, now that Magnus has had his own masterpiece approved, according to his letters. The question is, Paul, why have you had your son arrested?"

Paul scowled and then motioned them to follow him into the back of the shop. They passed several young men and Paul stopped to motion one towards the front of the store. "Take care of the shop, Caspar, while I talk with Herr Hainhofer and his daughter. Don't disturb me unless it is an emergency."

At the back of the shop, Paul motioned them into a small office, and then toward several chairs placed across from a small desk. He sighed as the Hainhofers seated themselves.

"I'm sorry you had to come now, Philipp. But Magnus has gone insane. My wife and I had no choice but to put him in prison. He absolutely refused to change his mind." He scowled again. "And the girl was no better."

"What are you talking about, Paul?" Philipp asked.

"You know that while journeymen are prohibited from marriage, masters are required to marry?"

Philipp nodded.

"Well Magnus's inspection master, Johann Felwinger, has several eligible daughters and Johann and I had arranged to have Magnus marry his eldest daughter, Elisabeth. It wasn't a perfect match, but Johann has no sons and wanted to provide for his daughter while at the same time easing Magnus's entry into the business side of Cologne clockmaking. Johann's health hasn't been good, so this would ease several concerns and provide Magnus with a ready clientele."

"He decided to marry someone else, didn't he?" Augusta interrupted.

"Exactly," Herr Fetzer said. "But that wasn't the worst of it. It was who he decided to marry that has caused all the trouble."

"Who?" Philipp asked.

Paul grimaced in distaste. "Barbara Leichnam, the skinner's daughter. As you can imagine, the clockmaker's guild is in an uproar and are threatening to expel Magnus from the guild. They have petitioned the city council to block the marriage. Johann is scandalized and on the warpath and as for his daughter . . . well . . . she never wants to see or be near Magnus again. My own business was beginning to suffer, so Maria and I thought it best to have Magnus put in prison for disregarding the wishes of his parents. He is still underage at twenty-four."

Augusta nodded. The skinner trade was among the most dishonorable in Germany, even worse than executioners. No father in an honorable trade would want to see his son or daughter married into a family of skinners. No wonder Herr Fetzer was upset.

"How long has he been in prison?" Augusta asked.

"Three weeks. He's a stubborn boy. He refuses to reconsider. So tomorrow we try a different tactic. After considerable discussion with the Leichnams, it was decided to imprison the girl instead." Subconsciously Paul wiped his hands on his shirt. Clearly he was uncomfortable even talking with

members of a trade like the skimmers.

"Will that work?" Augusta asked.

Paul shrugged. "Who knows? Right now both are refusing to listen to reason, despite all the threats and cajoling that has been done. *Insania filia amoris.*"

\* \* \*

"Love is blind," Philipp muttered as they walked back towards the Inn of the Golden Grape.

Augusta smiled. "*Azah camabet ahava,*" she said in Hebrew.

Philipp shook his head. "Hopefully not. If love is as strong as death in this case, Georg will have to find another master to work for. And Magnus, despite his talent, will never work for the clockmaker's guild in Cologne, or any other city in southern Germany. The journeymen's associations will see to that."

"Then we'll just have to talk him out of it," Augusta said.

\* \* \*

Peter von Hardenrat walked around his new writing desk again. Perfect. It was perfect for an *Amtmeister* of the *Eisenmarkt Gaffel*, the political guild dominated by the iron merchants. Made of ebony, dark leather and cast iron, the desk stretched most of the width of his office. It had taken two days for Philipp Hainhofer and the two cabinet makers he had brought with him from Augsburg to put it together. But now . . .

"So where are the artifacts from Grantville you mentioned? You can be so mysterious, Philipp!"

Philipp smiled at the cabinet maker next to him, Ulrich Baumgartner. "Show him, Ulrich." With a flourish Ulrich reached under the desk on the left side and manipulated a lever. Several wooden doors on the drawers at the front of the desk clicked open. Philipp motioned for Hardenrat to inspect them. The first drawer contained a clear rectangular container with five coins.

"Is this the plastic we heard so much about?"

Philipp nodded. "The coins are part of what is called a 'proof set.' These are the first five state quarters minted in the uptime year of 1999, roughly a year before the Ring of Fire. It's difficult to believe, but these were minted in the millions. The detail is really quite exquisite. And to see that more clearly . . ."

Hainhofer reached into the second drawer, narrower than the first, "A viewing device with lenses."

Von Hardenrat took the red and black cylinder and then rotated the black portion. Two lenses labeled "5" and "10" rotated into view. Peter took the coins and lenses to the window for better viewing.

"My God, you are right, the detail really is amazing! Have you looked at this horse on the Delaware quarter?"

Philipp laughed. "A number of times. But what really convinced me to purchase this for your desk, despite the cost, was the motto on the Georgia coin. Very appropriate for a political leader in Germany right now, don't you think?"

Peter peered more closely at the Georgia coin. "Wisdom, Justice, Moderation." He smiled. "Quite appropriate."

For the next hour Ulrich and Philipp demonstrated the intricacies of Hardenrat's new writing desk. When they began to leave, Peter drew Philipp back into his office. Philipp motioned for Ulrich to continue and then shut the office door.

"Yes, Peter?"

"I have some news about the Magnus Fetzer problem," Peter said. "The city council will allow the

marriage to go forward, assuming the parents give their permission. But if the marriage does go forward, then they will also support the clockmaker's guild threat to expel him." Peter shook his head in exasperation. "No honorable guild will employ him here in Cologne. So if he decides to stay, he will have to work as a day laborer."

Philipp sighed. Then what would his son do? He supposed he could send Georg back to Augsburg. But Georg and Magnus had been friends for years and had worked well together.

Peter held up his hand. "There is another possibility, however, if Magnus would be willing to relocate."

Philipp cocked his head. "Relocate?"

Peter nodded. "Have you heard of Jost Buergi?"

"Of course. But isn't he dead?"

Peter laughed. "Not yet, although he must be close to or over eighty years old. Apparently he was returning to Cassel from Vienna in late 1631, intending to live out the rest of his days close to home and kin. And guess where he happened to stop over for a visit on the way."

"Grantville?"

"Exactly. He helped restore the clock on the middle school to working order. That job and all the new knowledge he discovered there seemed to invigorate him. He and an up-timer named Phil Reardon are helping set up the Essen Instrument Company for Louis de Geer."

Jost Buergi was as famous as Tycho Brahe and Johannes Kepler. All three had been invited to Vienna by Emperor Rudolf II. Because of Jost's mechanical ingenuity and mathematical abilities, the Landgrave of Hesse-Kassel had even declared him to be "a second Archimedes."

"Are you saying that Magnus and Georg could get work with Buergi in Essen?"

Peter shrugged. "Why not? Magnus has a lot of talent, from what you've told me, and Georg is very precise in his work. De Geer asked me to be on the watch for men with mechanical ability. And the Dutch don't have the same kinds of problems with honor and dishonor as the German guilds do, especially in Essen." He smiled. "Now you just have to convince Magnus and take care of the marriage issue."

"Ah yes, the marriage issue. Or more precisely, the parental permission aspect of the marriage issue."

Philipp shook his head. Perhaps his children had come up with something.

\* \* \*

"You really aren't helping very much," Magnus Fetzler complained, looking around the table at Sophie, Augusta and Georg Hainhofer. "I want to marry Barbara. I'm going to marry Barbara. I love her, and she loves me." He sighed. "She is my soul mate. My stomach hurts just thinking about her."

The public room of the Inn of the Golden Grape was beginning to fill as the businessmen staying there came down from their rooms for dinner and merchants stopped by to indulge in a glass of wine before heading home. There were many fewer wine taverns in Cologne in 1633 than had been true in the late sixteenth century as beer became more popular. The few higher class businessmen's hostels that still served wine did a thriving business.

"Hunger pangs are no problem," Georg said. "The cook here serves an excellent roast pig."

Sophie hit her brother on the arm. "Its not hunger, silly. Its love pain." She smiled. "It's so romantic."

Augusta laughed. "You've been reading too many of those novels from Grantville . . . again." She turned to Magnus. "How did you meet Barbara, Magnus? You never did tell us. Given that her family has been

involved with skimmers for three generations, she obviously must live outside the city."

Magnus nodded. "Yes, their house is north of the city, on the Rhine. You remember how much I like eel?"

Augusta nodded.

"Well, several sons of fishermen I grew up with and who are now guild members themselves, used to stop by the skinner's house for a drink during bad weather along the river. A little gambling takes place and . . ."

Sophie laughed. "I remember. You always were interested in dice and strap jump-off."

Magnus nodded. "And you don't want to get involved with the sharper's rings here in Cologne." He shuddered. "They steal you blind and if you complain too loud you wind up in a brook with your head crushed. The council tries to outlaw them, but they move around a lot. So finding a friendly game is worth it, even if it is in the skinner's house."

Magnus held his hands out. "So . . ."

Sophie snickered. "Love at first sight."

Magnus nodded again, this time in misery. "Yes. My one true love." He put his face in his hands. "What am I going to do?" He moaned.

"*Trop aimer est amer*," Sophie said.

Georg nodded in agreement. "Full of trouble indeed."

"*Men verdrinkt zowel in de liefde als in een rivier*," Augusta said.

"Oh, stop showing off, Augusta," Sophie said crossly. "None of us understand Dutch except for you."

Augusta pouted. "I was just agreeing with you. It translates as 'One can drown in love as well as in a river.'"

Sophie suddenly sat upright. "That's it!"



"What?" Georg asked.

Sophie motioned her siblings in to the center of the table. "Remember 'Romeo and Juliet'?"

Augusta smiled. Georg looked puzzled. Magnus took his face out of his hands with a clueless expression on his face. Sophie looked over at her sister. Men were so dense.

\* \* \*

Barbara Leichnam listened for the towermaster's footsteps to fade away before returning to her task. She

had her doubts about the plan that Augusta Hainhofer had come up with. But if this was the only way to be with her beloved . . .

It took over an hour to sharpen the metal spoon Augusta had slipped to her. Then she had to wait for just the right time. When that time came, Barbara reminded herself that the cuts had to be just right.

\* \* \*

Towermaster Hans Schreck was making his usual rounds when he came to Barbara Leichnam's cell. He was a bit nervous about this prisoner. It wasn't just her size, although she was one of the tallest women he had ever met. It was also the reputation of her father, Martin Leichnam. Not a man to make angry, not at all.

Hans glanced into the cell, expecting to see Barbara kneeling in prayer. Instead he saw her body on the floor in a pool of blood.

"Dietrich, get the physician! Barbara Leichnam has committed suicide!"

\* \* \*

Magnus looked at the fast-flowing Rhine, buried in his own thoughts. Was this really the only way to be with his one true love?

*Courage, Magnus, courage. Barbara was courageous. Now it is your turn.*

"I'm coming, sweetheart."

Magnus jumped into the swift moving waters of the Rhine.

\* \* \*

Martin Leichnam glared across the room at Paul Fetzter.

"This is your fault, Fetzter. I should never have listened to your drivel about my daughter. If you had had more control of your son . . ."

"My son would never have met your daughter if you didn't allow honorable men into your home for gambling and drinking!" Paul responded. "Your kind are an abomination!"

"My kind?" Leichnam said softly. "My kind are the ones keeping you from drowning in your own filth, shopkeeper. Perhaps it's time for my dagger to bury itself in your doorpost."

Fetzter blanched. Such an act would be terrible for business. And he would be unable to remove the dagger without incurring an honor offense himself. His own *gaffel* might expel him as the clockmakers had expelled Magnus.

"Please, gentlemen, please," Philipp said. "Clearly the suicide attempts by both Barbara and Magnus show the depth of their affection for each other. Perhaps they are indeed both insane with love. But unless you want to jeopardize their souls . . ."

Martin nodded. "I've done what I could. Barbara will be expelled from my house, but to preserve her soul I give my permission for her marriage to Magnus Fetzter."

Philipp looked over at Paul. "Paul?"

For a moment it looked as if Paul Fetzter would maintain his obstinacy. His will crumbled when he saw Leichnam place his hand on his dagger.

"All right! I agree. I give my permission for Magnus to marry Barbara. We have done all that we can. But what will he do for a living? The clockmakers have expelled him and the city council has upheld them!" He looked over at Martin.

Martin shook his head. "Don't look at me! I won't have him!"

Philipp smiled. "I think I have found just the position for Magnus. In Essen."

\* \* \*

"They look so cute," Sophie said.

"Cute is not quite how I would describe them," Georg said slowly. Barbara and Magnus were arm-in-arm waving to the few friends they left behind in Cologne as the ship moved away from the dock. Both were tall, over six feet. But where Magnus was thin to the point of emaciation, Barbara was solid and broad as a warhorse.

"Oh come on, Georg, where is your sense of romance?" Augusta said. "I remember you being all goo goo eyes over Sybilla Waiblinger."

"That was different." Georg said.

"Oh right, different," Sophie said. She looked at Augusta. "*Amantes sunt amentes.*"

Augusta smiled. "Latin. Lovers are lunatics." She thought for a few seconds. "Try this one . . ."

\* \* \*

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# Gearing Up

**Written by Sean Massey**

*Happy Acres*

*October 1633*

"*Du dummes, undankbares Stück scheiße!*" Jost Neubert screamed. He waved his arms and hit the old John Deere Model B tractor with his hat. The tractor hadn't seen this much work in decades, and steam now poured out of the radiator. "*Warum jetzt??"*"

Jost had harvested five acres of wheat on the other end of the field this morning, and had hoped to bring in a large portion of his crop before the sun set. But here it was, early afternoon and only half an acre harvested when the tractor broke down.

He unhitched the pull-type combine harvester from the tractor. *I wish I had one of those fancy motorized harvesters.*

The tractor, like the land he was farming, had once belonged to Ted Moritz's father. The land had been slated to become a subdivision until the Ring of Fire intervened. Ted's father had also been an avid fan of what he called the "Golden Age" of mechanized farming and spent a lot of time restoring old tractors and farm implements. Except for a few items that he held onto for sentimental reasons, Ted sold most of his father's collection.



"Having problems, Mr. Neubert?"

Jost looked up. He could barely make out Gary Rose standing near the road, accompanied by Marie Moritz.

"Yeah, Gary," he shouted. "Can you come take a look at it?" Gary Rose was the ad-hoc mechanic on the Neubert farm, and he had been responsible for keeping the two tractors, which were pushing the half-century mark, in operating condition. That had been a tall order, since two years of hard work for the Grange, along with a lack of regular maintenance, had taken their toll on the engines.

Gary looked the tractor over and shook his head. "Looks like you're really cooked her. I don't know if I'll be able to fix her this time." He paused a moment. "It might take all night, but maybe I can have the crawler back together by tomorrow."

"That would be great, Gary," Jost said. "I really need to get this crop in. Sometimes I wish I could have a new mechanical beast. Then I wouldn't have to keep you here all night working on these old beasts."

\*\*\*

"Where's Gary?"

Marie shrugged. "He was talking with Mr. Neubert, Tad. It looked like he was having some problems with one of Dad's tractors."

Tad, Phil Jenkins and Albert Neubert were comparing different teams in one of the final video football games released before the Ring of Fire.

"Son of a . . ." Phil said. He cut himself off. He swore enough lately, and his mother hadn't been thrilled to learn of his expanded vocabulary. "All right, guys. It looks like Gary won't be joining us today. Let's get started without him."

"Isn't that Gary?" Albert said. He was looking out the large front window that overlooked the street. Gary was walking by, apparently oblivious to everything around him.

A mischievous smile spread across Phil's face. "Let's sneak up on him."

\*\*\*

Gary was lost in his own little world contemplating the work he had to do when he reached the shed. He began to unlock the door, not even realizing he was doing it.

"Hey Gary!" someone shouted.

Gary fumbled with his keys and dropped them.

"Hey!" the voice called again. It was Phil Jenkins. "You gonna come up and join us?"

"Not today, Phil," Gary said. "I got work to do."

"Sure." Phil smirked. "You just don't want to come up because Sunshine isn't there."

Gary felt the blush creeping up his face. He had nursed a huge crush on Sunshine Moritz for some time now. Not that it mattered. She never noticed him, since she was after Phil. Gary's stumbling efforts to get her attention hadn't even gotten the time of day out of her. .

"It has nothing to do with Sunshine," he said. "I need to finish fixing the other tractor so Jost can get his harvest in. And how's Maria these days?"

Phil rolled his eyes. "Come on, man. That's low. You know she left two weeks ago. Why don't you at least come up, pick your team, and play your first game? We can simulate the rest until you're done. Or we can come down and help you so you get done sooner."

"What're you? Crazy? Unless you're gonna be here at three in the morning helping me, I don't think that's gonna happen. If it wasn't a Friday, I wouldn't even be doing this."

"Come on," Phil said. "Why can't Mr. Moritz do this? They're his tractors. Besides, you know you want to come up and see if Sunshine is home."

"You're not going to drop this until I go up there, are you?" Gary asked.

"No," Phil said. "I'll even help you out. Even if it takes all night."

Gary chuckled. "The last time you said that, you fell asleep at *eleven*. Right in the middle of *Office Space*, too."

"I'll stay up this time," Phil said. "I swear. We're not watching some crappy movie."

"Dude," Gary said, "it's not a crappy movie. You just have no sense of humor."

"Right," Phil said. "Keep telling yourself that. So are you coming?"

"Yeah. Let's go."

\*\*\*

Gary yawned. It had to be about three in the morning.

He didn't know how Phil could sleep on the shed's concrete floor with only a cruddy old blanket to keep him warm, but he somehow managed that an hour ago. At least all the hard work was done by then. Phil had stayed awake long enough to get the engine remounted on the tractor's chassis and reconnected to the drive train.

Gary was beginning to feel a little tired himself, and he wished he had a Coke or something. He could use the quick boost of energy.

He yawned again and picked up the shop manual—an old book that showed how the engine and drive train fit together. The picture started to blur, and he shook his head to clear his vision. *Thank God that Mr. Moritz and his father used to restore these things. I don't know how I would get it done without them.* He flipped through the book until he found the exploded view of the drawing he was looking for. He rubbed some sleep from his eyes and pressed on with his work.

\*\*\*

Gary was startled awake by a rooster's crow. He wiped some drool from the corners of his mouth and massaged a kink out of his neck. The tractor seat wasn't the most comfortable place to sleep, but it was much better than a concrete floor.

Phil was still sleeping in the same spot. The floor couldn't have been as warm or comfortable as a bed, and he was amazed that Phil hadn't gone home.

After a few quick stretches, Gary inspected the tractor, hoping he hadn't missed anything. Having the tractor break out in the field because he missed something would be a bad thing, and he didn't want Jost to miss a rent payment to Uncle Huddy.

The rooster crowed again. *Oh crap! I bet it's already after 6. Mom is gonna be pissed when I get home. I should have called her before I started working on this. I'm dead.*

\*\*\*



"Yes, Mrs. Rose," Mrs. Neubert said. "I'll send someone down to check on Gary, and when he gets up here, I'll make sure he calls. And I'm sorry this whole thing happened. Jost should have had more sense to make sure he checked in with you first. You have a good day."

Wilhelmine Matz watched as her aunt carefully navigated the minefield that Gary's poor sense had caused. She was always amazed by Aunt Franziska's diplomacy skills and tact, and hoped that she had inherited them..

"Mina, would you be a dear and go down to the shed to check on Gary? And tell him to come up here when he gets done. I should have some breakfast ready soon."

"Yes, Aunt Franziska," Mina said. She wondered what Gary would look like after a night of working on an engine as she slipped on her shoes. She giggled as she imagined his hair disheveled and strategically placed grease smears across his face. She hadn't really admitted her crush on him to anyone. He was two years younger . . . and interested in Sunshine.

*I don't get what guys see in Sunshine. She's a . . .* Mina struggled to find the word to describe Marie's younger sister, but she couldn't find just one word that fit. *Besides, she's too skinny. Whenever she wears that bathing suit, I can count her ribs. Worse, she's a . . . gold digger. That's what the up-timers call it. Why do guys like girls that?*

When she finally reached the shed where Gary was working, she was surprised to see the doors wide open. She could see the top of his head peaking out from behind the green caterpillar tractor. The butterflies in her stomach began to fly around. She turned as if she was going to walk back toward the house and began to chew on her thumbnail. *What do I say? I didn't think he'd be awake!*

"Mina?" Gary asked. "What're you doing down here?"

"Your mom . . . um . . . called, and you're supposed to, um, come up and call her back."

He smiled. "Yeah, I forgot to call her last night. I'm probably going to be grounded until I'm thirty."

"Oh," she said. "I'm sorry that my uncle got you in trouble."

"It's my fault." Gary shrugged. "I should have called. Oh well. I'm sure it won't be that bad. It's not like Larry hasn't been out all night with some girl without calling, and he usually gets off kind of easily."

\*\*\*

"Mom," Gary whined, "that's not fair. I'm only asking if I can go to the library after school. It's not like I want to go running around town with Freddy and Larry!"

"I said no. Because you're grounded," Maxine Rose said. "That's what happens when you stay out all night and don't call."

"But I was working," Gary said. "And if you let me go to the library after school, I'll be working on some ideas that I have for Jost's farm." He could tell he wasn't making any headway, and really didn't want to try the last resort—groveling. "Mom, please? This is important."

"Fine," she said. "But don't think you're getting off easy. You've just added another month to your punishment, and you need to be home by five every night. And you'll have more chores around the house."

\*\*\*

Mina didn't find the dog-eared paperback that interesting, but it was one of the few romances that she hadn't read yet. She was starting to wonder if she'd have to start reading something else, like science fiction.

*Like anyone wants to read any of that,* she thought. *How can you make a story out of space and technology?*

She began to read the first couple pages of the novel. *How could someone waste paper on this? I can probably write a better novel!*

Mina didn't bother to pay attention as she walked. She had been in the library enough that she knew the layout almost as well as the back of her hand, and she could read while walking without running into anyone.

Except today. As she rounded the corner at the end of one of the stacks, she didn't see the large stack of books with legs walking right toward her. The stack couldn't see her either. The next thing Mina knew was that she was on the ground, covered in books.

"Sorry, Mina," she heard the other person say. "I didn't see you there."

"It's okay," she said. She brushed a lock of blonde hair from in front of her face, then checked to make sure her ponytail had stayed in place. "It is my fault for trying to read while I was walking." She shook a couple of cobwebs out of her head and looked up at the person she ran into. *Oh! It just had to be Gary! As if this couldn't get more embarrassing.*

"Are you alright, Mina?" Gary asked. He extended his hand to help her up, and within a few seconds, she was back on her feet.

"Yeah," she mumbled. "I think I will be okay. I heard about the trouble you're in because you were working for my uncle. I'm sorry about that."

"It's okay," Gary said as he bent down to stack up his books. "Mr. Neubert gave me a good idea to work on while I'm being punished." As he stacked his books, he found her paperback. "This must be yours."

You really should find something better to read. This stuff will rot your brain."

Mina sent Gary a look that would have killed. "Well, what would you suggest I read?"

"I dunno," he said. "Whatever you feel like, I guess. So what have you been up to lately?"

"Don't change the subject on me, Gary Rose," Mina said. *God, what a stupid boy. He can be so cute sometimes, but then he opens his mouth.*

Gary sighed. "I usually read regular fiction and science fiction."

"I don't know what you find so appealing about spaceships and laser swords and little green guys who talk in funny sentences."

"Star Wars you have seen, mmm?" he said in his best Yoda voice.

Mina tried to stifle her laugh, but she couldn't hold it in. "Gary, cut it out. I guess I just like these books better. Who knows, maybe someday, I'll start writing my own novel."

"That would be really cool," he said. "I have to be home in about twenty minutes. Can I walk you to the bus stop?"

"I would love that," Mina said.

\*\*\*

They made idle conversation as they waited. Gary vaguely talked about his project and the time he was putting in at the library. Mina talked about how her cousin had made her come to the library to get a new book a couple of times a week.

When the bus pulled up to the stop, Mina stepped forward. Then she stopped and turned back toward Gary. "If I wrote a book, would you read it?"

Gary smiled. "That depends. You wouldn't be writing a romance, would you?"

"Of course," she said. "A very sappy one that's worse than the book I'm reading now."

"In that case," he said, "I'll definitely read it."

"See you tomorrow." Mina couldn't keep from smiling. She looked out the window and watched Gary walking away.

\*\*\*

*She's something else, Gary thought. But she's not Sunshine.*

"No one is quite like Sunshine," he reassured himself. But he had trouble thinking about anything but the shy German girl.

### ***November 1633***

Lights were burning in Uncle Huddy's study when Gary got home He swore silently. There was no way he could sneak by, and since he was supposed to be home before dark, he figured he'd be in for another week of being grounded.

"You're late," Huddy said. "You're lucky your mom's not back from the office yet."

"Sorry, Uncle Huddy," Gary replied. "There aren't many clocks in the library."

"You've been spending a lot of time there lately. You're not hiding your girlfriend there, are you?" A broad smile spread across Huddy's face.

*How did he know I was spending time with Mina?* "What girlfriend? I'm grounded, remember?"

Gary turned to walk up to his room, but Huddy stopped him. "Jost stopped by today to drop off this year's rent payment. He mentioned that you were looking into building some farm equipment for him."

"Oh!" Gary said. "Well, I wasn't going to build it for him. He just said that it would be nice to have some newer equipment, and I decided to look into that a little."

"That sounds like it would be a good business opportunity," Huddy said.

Gary swallowed hard. He hadn't really thought about the business part yet, just about the millions he could be making. "I don't know, Uncle Huddy. I was trying to do a little research on farm equipment, but I'm not really an expert on it. And you're always so busy with your other projects, I figured you wouldn't have the time to help me out."

"You're my nephew," Huddy pointed out. "This will be a huge project and you're going to need some help getting organized."

"But what about your other businesses and projects?" Gary asked. "And what's your cut going to be on this one?"

Huddy laughed. "Not as much as the other businesses I organized. I promise. They pretty much run themselves now. I just cash the checks they send me."

Gary knew that was only half true. Huddy spent a few hours every night after dinner reading reports and making phone calls to his business partners. Most of those businesses had become successful, mostly because Huddy was either there to help organize them or brought in later to make them successful.

"Why don't you show me what you've come up with?"

Gary reached into his backpack and pulled out the old notebook. He flipped to the page where he started taking his notes. "It's all there . . . if you can read my handwriting."

"How about you go and wash up while I read it? We'll be eating as soon as your mom gets home from the office, which should be any minute now. Larry insisted on cooking tonight since Melissa is coming over."

Larry's cooking never ceased to amaze Gary. Larry could barely be bothered with it, and most of his meals were barely on the right side of edible. Unless Larry was inviting a girl over, then he came up with some great meals that left everyone wanting seconds. Sure, he wasn't an Emeril Lagassi or a Bobby Flay, or even a Mr. Food for that matter, but he could be a decent cook when he put his mind to it.

The Rose household had always sat down for dinner together, and Mom didn't let the Ring of Fire change that tradition. Uncle Huddy tried to resist, but Gary's mother eventually forced him to come eat and talk about his day with the rest of the family.

Gary started to walk away, but a thought popped into his head. "If I do decide to start a business building farming equipment, where will I get the money to do it?"

Huddy looked up from the notebook and smiled. "We'll talk about that later. A good business opportunity isn't something I'm going to pass up. And there's always your college fund, if you're willing to take a risk."

"You bet I am," Gary said.

### ***January 1634***

"I wonder where Gary's been," Mina said. "He hasn't been here all week." She flipped through the pages of her journal, where she had kept her story and character ideas, trying to take her mind off of her missing companion. *It's not like we're dating or anything. We're just friends. Who spend time together at the library. He's not courting me. He likes that conceited bag of antlers, Sunshine. Who has never shown any interest in him.*

Mina tried to push it out of her head so she could focus, but the more she tried, the more she seemed to dwell on it. Almost an hour had passed, and if she didn't leave soon, she would miss the bus and have to walk home.

She packed up her things and put on her coat. "I can't wait for him any longer. Aunt Franziska will kill me if I'm not there to help with dinner."

\*\*\*

Gary fell into the overstuffed chair, stretched out and closed his eyes. He wanted to fall asleep where he sat, but he still had homework from his drafting class to complete. "That machine shop is going to kill me. And I'm too young to die." Huddy had insisted he take a job at Nat Davis' machine shop, since he lacked any kind of manufacturing experience.

"Rough day?" Huddy asked. "You look like you could use a nap."

Gary yawned. "Yeah. Do I really need to take all these classes at the tech center? Isn't working at Nat's enough? "

Huddy sighed. "There really isn't any other way you can learn if you want to follow through with your ideas. You need both."

"But I never get to see my friends anymore," Gary said. "Not even on the weekends because you have me working at Nat's on Saturdays. I'm still a kid."

*Let's be honest, Gary thought. I haven't spent any time with Mina. I kinda just stopped showing hanging out with her all the sudden, and I miss spending time with her.* He stopped for a second, wondering why he had just thought about Mina. Why hadn't he thought about Sunshine?.

"If you don't learn this stuff quickly, someone else will start building them," Huddy said. "You'll have a harder time if they get to the market before you."

"Someone will probably be building and selling these plows by the time I get done with these classes anyway," Gary responded. "The market for agricultural tools is growing. Remember that guy who was making mini-threshing machines out of lawnmowers after the Ring of Fire?"

Huddy nodded.

"Will I be able to bring my ideas to market if you keep making me sit on them while I learn?" Gary asked. "At least let me use the next couple of weekends to start building the plow. I think I have my production process mapped out. With some machine tools and some labor, I think I can get a couple of these ready for testing by the spring planting season."

Huddy pondered for a second. "You win. What do you need?"

### ***March 1634***

Mina slammed the phone down for what seemed like the hundredth time. As much as she wanted to, she couldn't bring herself to dial Gary's number. *The guy is supposed to call you. That's what the girls say.*

But she picked up the phone again, and this time, she managed to dial the first three numbers before slamming it back down. "How can you ever write a romance if you can't get it right yourself?"

A million thoughts began to run through her head. Marie Moritz told her to just call Gary. Other girls at school had told her to wait for him, or worse, use another guy to make him jealous. Mina wasn't that way, and she didn't want to play with his head like some of her uptime friends liked to do to their boyfriends.

She picked up the phone for the one hundred and second time and dialed the whole number. The phone

rang twice, but her nerves started to get the best of her and she slammed it down again.

She sat there by the phone, trying to build up her courage to call again when the phone started to ring. She nervously picked it up. "Hello?"

"Mina, it's Huddy Colburn. Did your uncle just try to call here?"

Mina's jaw dropped to the floor. How did he know that someone had called from her house? She didn't know much about the phones, and as far as she knew, there was no magic box that could tell which numbers were calling. Part of her wanted to just hang up the phone, but she couldn't do it. *This is your chance.*

"Hello?" Huddy asked. "Are you still there?"

"Yeah," Mina replied. "Uncle Jost didn't call your house. I did."

"Oh," he said. "Which one of my nephews did you want to talk to?"

Her heart began to race. Beads of sweat started to form in her palms. "Gary," she said. It was barely audible, almost like a squeak.

"He's over in Ted's equipment shed if you wanted to talk with him today," Huddy said. "He's probably going to be there all day. But I'll let him know you called."

*Please don't!* She wanted to scream that at the top of her lungs. Would Gary think she was being too aggressive by calling him? Did he even like her? *Why does this have to be so complicated?*

"Mr. Colburn," she said. "How did you know someone called you from this house?"

"Caller ID," he replied.

\*\*\*

"Careful with that!" Gary shouted. Larry and Freddy were removing the cupola from the furnace. Molten metal bubbled, waiting to be poured into a few molds that Gary had crafted over the last two weeks. "I don't need you melting your foot off because you were careless."

"Relax, Gary," Larry said. "Freddy and I both did this when we were working at Nat's. I think we know how to handle ourselves."

But Gary couldn't relax. His brother was working with some dangerous materials, and he couldn't help but think of Larry, in the hospital in Fairmont, recovering from an accident that left him with some scarring on his back and a healthy, but short-lived, fear of his chemistry set. Larry might have gotten over it, but Gary knew he would never be able to forget it.

He watched intently as his brother and Freddy poured the molten steel into the first two molds. He took careful notes, and when they had finished, asked a few questions. He needed to know everything they knew as both Larry and Freddy would be leaving for the military in a couple of months.

"I think you should pour the last two," Larry said. "I'm not going to be here forever to do this for you."

"All right," Gary said. "Let's do this. Hey Ernst! Why don't you take Larry's spot?"

\*\*\*

When Mina reached the shed, she could see Gary and her brother Ernst pouring something into a wooden box. Not far from where they were working, she could see some glowing red coals.

*It looks kind of dangerous,* she thought. *I probably shouldn't go in there.* She waited by the edge of the shed, half hidden behind the wall, until they were finished. The last thing she wanted to was to get injured by whatever they were working on.

As soon as Gary, Ernst, and the rest of the guys working with them had set their equipment down and

started to walk out, Mina moved from behind the shed wall.

"Hey, Gary," Freddy Genucci said. "Looks like Sailor Venus is here to see you."

Mina felt the blush start. *How does Freddy know?* she wondered. *What can I say back to him, and what is a Sailor Venus?* She said nothing. Gary didn't say anything either, and an awkward pause fell over the group.

Larry finally broke the silence. "When was the last time Marie came to see you, let alone said something to you, Freddy?"

"You got me there," Freddy said.

"So why don't you leave Gary and Mina alone? You're my friend and all, but sometimes, you say some pretty stupid stuff." Larry started to walk towards the Moritz house. "Let's give them a few minutes.

That means you too, Ernst. I know she's your sister, but I can vouch for my brother. He's not like me."

As soon as everyone was out of earshot, Mina asked "Why didn't you call me? We were spending so much time together at the library, and you could have let me know that you weren't going to be coming one day."

"But I . . ." Gary started to say.

Mina laughed. "Marie said I should give you a little crap. You could have called, you know."

"Yes, I probably should have," Gary said. "I'm sorry."

"You're not going to get off that easy, mister," she said. "We're having a family movie night tonight, and we're watching some movie about a lion who is king. Would you like to join us?"

"Sure," Gary said. "That's a pretty good movie."

Mina tried to hide her shock. *Did I just ask Gary out? And did he just say yes?*

### ***April 1634***

The fog forming from her breath should have told Sunshine Moritz that it was too cold to go for her morning run, but she didn't mind the temperature. The cold was invigorating, and the quiet roads gave her a few precious minutes to be alone with her thoughts. The view was spectacular as well, and she loved the deep reds, purples, and oranges of the early morning sunrise.



"I hate this century," she said.

Nothing was going according to Sunshine's plan. If it hadn't been for the Ring of Fire, she would be looking at colleges in sunny spots far away from Grantville and spending her weekends letting Phil Jenkins, who probably would have been a football star, take her out on dates.

But Phil was gone on some adventure halfway around the world. Most of the guys already had girlfriends or the downtime equivalent of a girlfriend. Sunshine couldn't understand what the guys, especially the ones who were getting to be successful, could see in the local girls. *Stupid peasants! Their clothes are so ugly and dull.*

Not a single one of those guys had paid any attention to her. Except Gary Rose, whose schoolboy crush she had tried to stamp out from the day she learned of it. Now, he might be her only hope to get out of the town and into someplace better . . . if he made it big selling plows.

Sunshine couldn't help but laugh at that. Back up-time, football, baseball, and basketball stars were a girl's meal ticket out of town. But here, it was some geek who made plows or sewing machines. The irony hadn't escaped her.

As she jogged down the street, she could hear some commotion over in Jost Neubert's shed. *They're up early. I wonder what they're up to.* She rounded the corner and started down the road that would take her into town.

Sunshine was half a mile up the road when a bicycle rounded the hill she was heading up. She strained to see who the rider was, but the light on the front of the bike, combined with the pre-dawn twilight, made it difficult to see.

When she was halfway up the hill, she finally recognized the rider. "Hey Gary!"

The brakes on Gary's bike squealed as he came to a stop almost right in front of her. "Hey Sunshine," he said groggily. "How are you?"

She flashed him a quick smile and tried to get a quick read on him. "I'm doing all right," she said. "What

have you been up to?"

\*\*\*

Gary's sleep-deprived brain didn't know what to make of the situation. Sunshine had never been this nice to him. He yawned. "I've been busy. Jost and I are going to test my plow design today."

"That's . . . cool," she said.

There was an awkward pause after that, and Gary could see that she was looking for something to talk about. Instead of waiting in silence, he seized the initiative. "I'm sorry, but I really need to get going. I was supposed to be at the Neubert's five minutes ago."

"Oh," she said. "Well, I guess I'll talk to you later." She started to run up the hill, but only got a couple of yards before she stopped. "I was wondering . . . if . . . you had anything planned this Friday night. Maybe we could go get a pizza or something?"

"I can't. I promised Mina I would take her stargazing."

"What about me? You used to . . ."

Gary's old feelings for Sunshine started to surface. He wanted to express them, and for a split second, he wanted to forget about Mina and follow the girl he had pined over for years. But he couldn't. Mina was everything that Sunshine wasn't, and he didn't want to give that up for a girl who ignored him until he was worth something.

He let the brake out and started to roll down the hill. "You had your chance," he said. "A lot of them. And now it's too late."

### ***March 1635***

"You wouldn't believe it, Jost," Gary said. "Ernst was great. He managed to sell three plows before he finished his demonstration. That's our fifth client so far this year, not including the tools he sold to the mining camps."

"I told you he'd be a great asset to you," Jost said. "But we can talk business later. There is someone waiting for you upstairs."

Gary didn't need to be told twice. He started to run.

The door to her room was wide open, but her head was buried deep in a book. He waited there in the doorway for a while, a wide smile on his face. "Hey, you," he finally said.

Mina's eyes opened as wide as he had ever seen them. She set her book down on the bed and nearly sprinted to the doorway. "Gary! When did you get back?"

"Just a little while ago," he said. "I missed you."

She kissed him. "I missed you too."

\*\*\*

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# Songs and Ballads

Written by Virginia DeMarce

Judith Roth claimed no expertise at the piano—only lessons from the seventh through the sixteenth years of her life. She had been profoundly grateful when the last teacher to whom she had been assigned at the Levine School of Music had concurred with her own assessment of her abilities and persuaded her father to let her pursue something "more in line with her natural aptitudes." He had suggested field hockey as a possibly more appropriate outlet for her talents.

She had given their hardly-ever-touched spinet to the elementary school when they moved to Prague. Somewhere in her soul, she had rather hoped that she would never have to get up close and personal with a piano again.

In spite of that, once Morris discovered that new pianos were being manufactured down-time, he had insisted on having one transported to Prague, along with Ingram Bledsoe to tune it once it arrived. Ingram stayed for two weeks, of which he twice spent four hours tuning the piano. To show some benefit from the rest of his time, he went home with orders for several more.

So. She might as well get some use out of the thing. Looking out over the neat rows of tapestry-upholstered, lightly gilded, chairs in the salon, occupied by the leading women—or, sometimes, just by the wives of the leading men—of Prague's Jewish community, she decided that she might as well open the first session of "Introduction to the Jewish Culture of the Up-time United States of America."

\* \* \*

"You're not really going to?" Morris came close to strangling on his pickled beets when she explained her plan.

"I have to start *somewhere*. It's the only LP I can think of that every single one of our friends from Hillel in Morgantown owned. Well, we were on the tail end of the phenomenon. The album came out in 1962. Couples ten or fifteen years older than us tended to have everything that Sherman ever recorded and some pirated stuff from his nightclub acts."

"That's pretty much the case."

"I don't want to use just that one album. I'll do the 'Ballad of Harry Lewis,' of course, since it connects to both 'John Brown's Body' and 'The Battle Hymn of the Republic.' And I have to have, 'Won't You Come Home, Disraeli.' How much of the lyrics do you remember? I can use that not just to talk about assimilation. It will also be a good lead-in for all of nineteenth-century British imperialism. Not to mention African-Americans and the blues. 'Harvey and Sheila.' Do they already sing 'Hava Nagila' down-time? Everything Sherman did is a classic, in its own way. Somewhere, I think, I used to have a privately made tape of his version of *My Fair Lady*. That would give us the whole Broadway musical scene to talk about. And the Borscht Belt."

"I suppose." Morris put his knife down. "Maybe you can do 'You Went The Wrong Way, Old King Louie' for the CoC."

\* \* \*

She had never taught anything like it before. Of course, she had never taught adults before. She had

spent her career with first graders. The closest she had ever come to adult education was, really, parent-teacher conferences. And ladies' book clubs. But. . . .

"Do you all have your hand-outs? If not, there are extra copies by the door. The text is in English, with



translations in parallel columns. Thanks to my auxiliaries here in the household, the translations and annotations are available in Yiddish, German, and Ladino." She waited a moment while a few women got up and went back to the tables set next to the entrance. Then she sat down on the piano bench and, to her own accompaniment, rendered "Sir Greenbaum's Madrigal," sometimes known as "Sir Greenbaum's Lament" by Allan Sherman.

*". . . that's no job for a boy who is Jewish . . .*

*". . . when I marry Miss Guinevere Schwartz . . ."*

\* \* \*

A month later, having covered to *almost* everyone's satisfaction the questions about Sherman's use of the English madrigal tune "Greensleeves," other derivative uses of the tune such as the SCA version, a brief

introduction to the Society for Creative Anachronism (to the accompaniment of many disbelieving exclamations), and why the name "Sir Greenbaum" was considered funny in itself, with excursions into the history of the adoption of surnames by the Jewish population of the Germanies in the eighteenth and nineteenth centuries, they moved on. To the next verse.

Judith had written up a short—relatively short, it amounted to about forty pages by the time she was done—synopsis of the Robin Hood ballads.

So why, given that Robin Hood had been an archer, was there an armored knight in Sherwood Forest in the song?

And why was the knight righteous? In what sense was he righteous? Was he righteous in that he kept the law perfectly? How could he keep the law perfectly while running around Sherwood Forest with a batch of gentile knights?

There were no dragons in the Robin Hood ballads. Why were there dragons in this song? Why did he need to smite them? What was the place of dragons in the up-time fantasy tradition?

With digressions ranging from Anne McCaffrey to Chinese art, Judith finally got dragons properly situated in the up-time fantasy tradition. Not without causing a great and unexpected demand for the Pern series in Prague. The printers, ever alert for a profit, were taking care of it.

She breathed a sigh of relief as she prepared for the next of the weekly class sessions.

The thought of Jewish knights continued to boggle their minds. A Jewish knight rescuing a fair maiden digressed into a discussion of *Don Quixote* that just would not quit.

Sir Greenbaum's reluctance to be a knight boggled their minds even more. A world in which no one was outraged by the very idea of Jews as part of the chivalric world and . . . the young ingrate . . . he didn't like the job? Forlorn? Heavy laden heart? He objected? Just because of . . . aluminum pants?

Hannah's husband had heard of aluminum. In fact, he had heard of Dr. Phillip Theophrastus Gribbleflotz and his search for the perfect aluminum pyramid. He had heard of crystal therapy. Aromatherapy. He had heard of . . . a lot of things that Hannah had her doubts about. Hannah checked every single one of them out. At length.

\* \* \*

Even with the translations, extensive annotations in regard to the topic of puns, and the fact that a lot of down-timers from King James I of England, now dead, to Margrave Christian of Bayreuth, still alive, were strongly opposed to tobacco, it still took a whole afternoon to explain the cultural context of, "Oh, would'st I could kick the habit, And give up smoting for good."

\* \* \*

Shaker Heights. Judith had a coffee table book with some pictures of houses and lawns in Shaker Heights. It was in storage in Grantville, but she sent a letter to Gillian Chapman at the jewelry store, explaining which box it was in and asking her to dig it out and express it to Prague by courier.

During the wait, she discussed resorts in the Catskills and Adirondacks. Because of Wallenstein's reforms, it was now legal for Jews to own real estate in Bohemia. Chava's uncle began to pursue a potential development in the *Boehmerwald*.

Connections in dry goods were self-explanatory. Working for one's father-in-law turned out to be a universal trope that transcended time and place, from the days of Laban and his daughters to the present day that was Prague to the future that had been the twentieth century.

But. . . . Where did Guinevere come from? She wasn't in the synopsis of the Robin Hood ballads. That involved King Arthur, and the knights of the round table. Would it really be acceptable to choose "Guinevere" as a gentile name for one's child? What about Arthur? Or Allan? Which necessarily brought up "Shake Hands with your Uncle Max" and plastics.

Followed by an afternoon in the kitchen, with cheat sheet, demonstrating how easy it was to make casein boxes and buttons like those being manufactured in Jena. Followed by Jason Gotkin and a rabbinical delegation, worried about the kosher nature of items placed in casein boxes or fastened with casein buttons. And, shortly thereafter, by the appearance in Prague of three baby girls named "Pearl."

The printers of Prague brought out *A Connecticut Yankee in King Arthur's Court*.

Judith had expected one weekly class session for each song. "Sir Greenbaum's Madrigal" all by itself required six months of weekly class sessions.

\* \* \*

Gitele, who had twenty-five years, four surviving children, and the best English in the room, had been reading ahead. She raised her hand. Judith nodded.

"Do you perceive a teleological connection between the 'Granada' of this camp we will start studying next week and the Granada in Sepharad from which our people have been expelled?"

Judith swallowed. She had never given any thought to teleological connections. She wasn't entirely sure what a teleological connection might be and was pretty sure she wouldn't recognize one if she met it on the street.

"Ah. None had previously occurred to me. I assure you that I will give the matter serious thought between now and the next meeting."

Before . . . well . . . before anyone else could think of anything else, she added hastily, "Adjourned. Class dismissed. There are refreshments in the dining room."

"With a Little Bit of Lox?" Gitele grinned.

\* \* \*

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# The New Romantics

Written by Kerry Offord

## *Grantville, February 1634*

Hazel Patton couldn't stand not knowing what the giggling was all about a moment longer. She poked her head around the corner to find three of her teacher trainees giggling over a book. Walking over to them she held out a hand for the book. Marcie Haggerty passed it over. Hazel sighed. It was by one of the worst of the up-time romantic novelists. Hazel absolutely refused to have her on the shelves of her personal collection. "Why are you wasting your time reading that rubbish?"

"I wasn't reading it, Mrs. Patton."

Hazel's raised her eyebrows.

"Honest, Mrs. Patton, Anna and Elisabeth were asking about some of the descriptions of up-time culture. They wanted to know if . . ."

Hazel held up her hands "I wouldn't trust anything that woman had to say about culture."

"Well, no, neither would I. But they sold, Mrs. Patton. That's what I was telling Anna and Elisabeth. Up-time they published hundreds of her books. I suggested they should look at Jane Austen and Georgette Heyer if they wanted examples of good romances."

Hazel looked at Anna and Elisabeth. "And why are you two so interested in good romances?"

Anna bit her lips and looked guiltily at Hazel. "My cousin works for a printer. He says the romantic novels sell well. We want to try and write one."

"You want to write a romantic novel?" Anna and Elisabeth nodded. Hazel checked Marcie. "And you? Are you trying to become the next best-selling author as well?"

Marcie grinned. "I'd like the money, but it's not easy."

Hazel settled her hands on her hips. "Of course it's not easy. They say write about what you know. What do you three know about romance?" Hazel stared at Marcie, daring her to claim she had experienced romance. Hazel knew all about young men, and romantic they weren't.

"Could you help?" Marcie asked.

Hazel froze. Then she smiled. Back up-time she'd often thought she could write a better story than some of books she received in those monthly bundles. "Yes, I very much think I can. Come round to my place after school and we'll start researching the good stories to see what makes them good."

## *The Schmucker and Schwentzel Print Shop, April 1634*

Ursula Fröbel ran her red pencil through line after line of the reworked *Abbreviated Manual of Statistical Principles*. Pretty soon she had to stop to sharpen it again. Pen knife in hand she glared at the manuscript. *Why can't the fool learn to listen to his editor?*



Ursula looked at the eight hundred odd pages yet to be reviewed and sighed. *Now would be a very good time to take a break from editing Norris Craft's manuscript.* She put it back into its envelope and tossed it into the pending basket. The way she was feeling about Herr Craft right now, it could go into the recycling bin, and to hell with the advance he'd already been paid. To take her mind off the author from hell she turned to her in-basket. Maybe someone had come up with another good idea, like the Grantville Genealogy Club's suggestion that they write a Who's Who of up-timers who came through with the Ring of Fire.

She sighed in fond remembrance. That had proven to be a real gem. They had sold out of the first print run of a thousand copies within the first week, and had done three more print runs since then. And unlike Norris Craft, the genealogical club had been happy to follow their editor's suggestions. But no, only a few bills and queries about advances on royalties populated the basket. That left the "lucky dip" of the "unsols," the unsolicited manuscripts. Why anybody would waste time and energy to write a manuscript without having a contract Ursula didn't know, but plenty of people did. Too many.

The "unsols" were usually dross, with few of them able to hold Ursula's interest as far as the bottom of the first page. The rule was to try and read at least that far before making a decision. Anything that passed got seen by one of the readers, people who were happy to be paid to read through the unsols and give an opinion. If enough of the readers liked a manuscript, then Ursula would read it, but not until then.

Ursula took the first unsol from the top of the basket. She struggled through the introductory sentence, all seventy-five words of it. Ursula was ready to junk it there and then, but there was the rule. Always read the first page before making a decision to dump a manuscript, it might get better. It was hard going, but Ursula managed to get to the end of the first page. There was no stamped self-addressed envelope supplied, so it went straight into the recycle bin.

The next was a bit better. It had a self-addressed envelope, so Ursula put one of the standard rejection forms into the envelope and put it into the out basket. The post would return it to the author.

An hour later there had been nothing worth while and Ursula was starting to get frustrated again. She reached for the next manuscript and started reading.

"Frau Fröbel? If it's not too much trouble, could you please have a look at these?"

Ursula looked up. Stephan Greiner, one of the sales assistants, was standing in front of her desk with a bundle of envelopes in his arms. "Sure. Put them on the top, I'll get to them shortly."

"Thank you, Frau Fröbel. One of them was written by my cousin Anna."

Ursula watched Stephan walk out of her office before turning her gaze to the unsols pile. There was a bundle of four envelopes tied together with string on the top of the pile. It was the first time Stephan had ever pushed forward a manuscript, and if she remembered correctly, his cousin Anna was training to be a teacher. At least she should know how to construct a sentence. She quickly dealt with the manuscript she had been looking at and reached for the bundle.

Ursula spread out the four submissions on her desk. Three of them were regular books. All words, no pictures. But Ursula's eyes locked onto the fourth manuscript. It looked like an illustrated children's book. She had a quick skim

through. There were pencil sketches on every page. Then she discovered the single watercolor tucked into a protective folder at the back. Ursula considered the image for a moment. It would be a challenge to reproduce that in a book.

Ursula settled down to do a little reading.

#### ***Four hours later***

Johann Schmucker looked up from the report he was reading across to his business partner. "Friedrich, we really need something special to take to Frankfurt for the fair. Something more than translations of up-time works."



Friedrich Schwentzel leaned back in his chair and propped his feet on the desk. "Yes, but what? Herr Craft still hasn't delivered a useable version of his *Abbreviated Manual of Statistical Principles* and we haven't had anything better than a bit of poetry and short stories in the last couple of months out of Ursula's unsols."

Johann grimaced. "Yes. Ursula has become a little vocal about the Craft rewrites."

"She enjoys it, Johann. Take no notice of her complaining. That's half her fun."

Johann looked skeptically at Friedrich. "When she storms in here after yet another lousy rewrite, I hope she puts the blame where it belongs."

A pocket battleship suddenly burst into the office, several large envelopes in her arms. So surprised was he at Ursula Fröbel's entry, Friedrich over balanced on his chair and fell backwards onto the floor.

Johann managed to remain seated. "Yes, Ursula?"

Ursula dumped the envelopes onto his desk. "For months the unsols have yielded nothing but rubbish, then suddenly, not one, but four good manuscripts land on my desk on the same day. And not only are they well written, they are written in German."

Johann had pushed his seat back when Ursula dumped the envelopes on his desk, his recent discussion with Friedrich at the front of his mind. Now he moved his chair forward and opened the top envelope. "What kind of stories are they?"

"Romances."

Johann looked down at the wad of pages in his hand. The first thing he noticed was that it was all neatly typed. "An up-timer author of romances written in German?"

"Only two of them are by up-timers, Johann. A Hazel Patton, and a Marcie Haggerty. The other two are local girls. Elisabeth Müller, and Stephan's cousin, Anna Greiner."

Friedrich, who had scrambled to his feet and righted his chair, walked over to the bookcase. Pulling out the *Grantville Genealogy Club's Who's Who of Grantville Up-timers*, he checked for the entries of the two up-timers. "Hazel Patton.

See Hazel McDonnell. Just a minute. Ah, here we are. Hazel McDonnell. Born September 21, 1929. She is the sister of Dr. McDonnell, and before the Ring of Fire she was a retired school teacher. Since then she has been working at the Fluharty Middle School tutoring the new teacher trainees." Friedrich looked up to see how that information was received.

Ursula nodded. "That doesn't surprise me. Stephan's cousin is a teacher trainee there. What about the other up-timer. The name seems familiar."

Friedrich flipped through the pages. "Marcie Haggerty, born March 15, 1982. Father Gary Haggerty. Ah, that explains your familiarity, Ursula. She's one of Frau Matowski's ballet dancers."

"I thought I recognized the name from somewhere." She turned back to Johann. "You both need to read these manuscripts. They are good, and they are different."

"How do you mean, different?" Friedrich asked. .

Ursula smiled. "Read them yourselves and find out." With a final smile Ursula left the office, shutting the door behind her.

"Phew!" Johann wiped his brow. "She had me worried for a moment there."

"Yes, well, don't just sit there, pick one and give me another. If Ursula wants us to read them, we better."

Johann passed Friedrich one of the envelopes. "Who's the boss here anyway?"

"You have to ask?"

Johann sent a glance towards the door. "No, I guess not."

### ***Frankfurt-am-Main, October 1634***

Johann Schmucker walked around the Schmucker and Schwentzel display booth at the Frankfurt book fair. People, potential buyers, were examining the stock. In pride of place was the Schmucker and Schwentzel encyclopedia, the new dictionary of arts, sciences, literature and general information. Beside it the Who's Who of up-timers also attracted some customers. The new romances by Anna Greiner and her friends were attracting a lot of interest, but it was the illustrated children's story by Frau Patton that was attracting the most attention. Who'd think a romance between a tough down-time alley cat and a pure bred up-timer cat could attract so much attention. Of course some of the attention might have been due to the illustrations that appeared on every page. Being able to duplicate the colors Frau Patton had used to paint her characters placed *Lady Chatterley's Lover* in a class of its own. Nobody was using color like Schmucker and Schwentzel.



"Herr Schmucker, this gentleman is interested in subscribing to the encyclopedia."

Johann offered his hand to the man beside Stephan Greiner. "Johann Schmucker. You have made a wise decision. When complete our encyclopedia will be the definitive reference of up-time and down-time knowledge. There will be nothing to compare with it, not even the famous eleventh edition of the *Encyclopedia Britannica*."

Martinus Waldburg shook hands. "The subscription would be for my employer. However, there is the small matter of the earlier volumes. My understanding is that they are all sold out."

"You are correct, Herr Waldburg. However, Schmucker and Schwentzel will soon be reprinting all of them."

"A second printing! That will be excellent. My employer will be overjoyed."

Johann opened the order book. "If you'll just give me your details."

\* \* \*

After dealing with Martinus Johann returned to watching the people looking at his books.

"How can you do this?"

Johann turned to see a man waving the flyer showing the proposed printing schedule of the second printing of the encyclopedia.

"You claim that your second printing will deliver the older volumes at such a rate that a person subscribing to the second printing will complete his set of the encyclopedia at the same time as those who subscribed to the first printing. There's no way you can set the pages fast enough to meet that schedule, and I doubt you've stored the old forms. It would need a massive warehouse to store them."



Johann grinned. "There isn't enough type in all Thuringia to keep that many pages made up, Mein Herr. However, we don't have that problem."

"What? How can you not have a problem?" The man was incredulous.

Johann smiled and tapped his nose. "We have a new method of printing back in Rudolstadt that means we don't have to store assembled forms."

"How can you do a second print run without having stored the forms?"

"We have a way. I presume you are yourself a printer?"

The man nodded. "Yes, Wolfgang Abegg. Perhaps you've seen some of my books. I do a lot of law texts."

Johann shook his head. "Sorry, I don't think I've seen any. That's more my partner's field."

"Partner? Master printers don't have partners."

"In Rudolstadt they do. It's the influence of the up-timers." Johann paused to consider Wolfgang. "You have heard of the up-timers and their city?"

"Grantville? Of course I've heard of the city from the future. Who hasn't? So they have taught you a new way of printing? Is it for sale?"

Johann almost said no, but then he took a moment to think. "Maybe, it depends on what you have to offer."

"Come with me. I'll show you my stand, and then we can talk."

### ***The office of Abegg the printer, March 1635***

Wolfgang Abegg picked up the bound book. Flicking it open, he paused to admire the title page. "Printed by Wolfgang Abegg of Frankfurt am Main". He carefully avoided looking at the next page where it announced the book had first been published by Schmucker and Schwentzel of Rudolstadt. He grinned to himself. No doubt Johann had the very same reaction to books Schmucker and Schwentzel published using flongs he sent them.

The flongs were a marvelous technical advance. Wolfgang had heard of people making clay molds of set type and casting whole pages or forms at a time, but Johann was the first person he knew of to try papier-mâché, and to have success in casting forms. The papier-mâché flongs were magnificent. A book like the romance in his hands needed fewer than thirty flongs, and they could be sent cheaply by the new air parcel service linking Grantville to Frankfurt. Within days of the first printing of a book in Rudolstadt, Wolfgang could be printing the same book in Frankfurt. The potential savings were staggering. Not that Wolfgang's fellow master printers had been impressed by that thought.

However, his print shop was currently the only one on the River Main with the new technology, and he had journeymen beating down his door for the opportunity to learn from him.

Wolfgang put down the romance and picked up the latest offering from Schmucker and Schwentzel. *The Trojan Horse* was another of Hazel Patton's illustrated children's stories. Opening it randomly he admired the printing of the color illustrations. He could hardly wait until his son returned from learning the new color printing method. The illustrated books were very expensive to print, but the sales of *Lady Chatterley's Lover* more than justified the effort. *If Frau Patton could just be persuaded to write a story featuring Brillo the ram, now that would sell well.*

**Grantville, April 1635**

"I don't know how you get away with it, Gran," Caroline Dorrman said.

Hazel Patton smiled at her heavily pregnant granddaughter. "Get away with what?"

"'Get away with what.' she asks. Your children's books. I mean, *Lady Chatterley's Lover*. How could you do that?"

Hazel reached down to scratch the ears of her pure breed Siamese. "It was very easy. It was about Lady Chatterley here."

"And the hit and run merchant that got her pregnant. I remember what you had to say when her ladyship had her kittens."

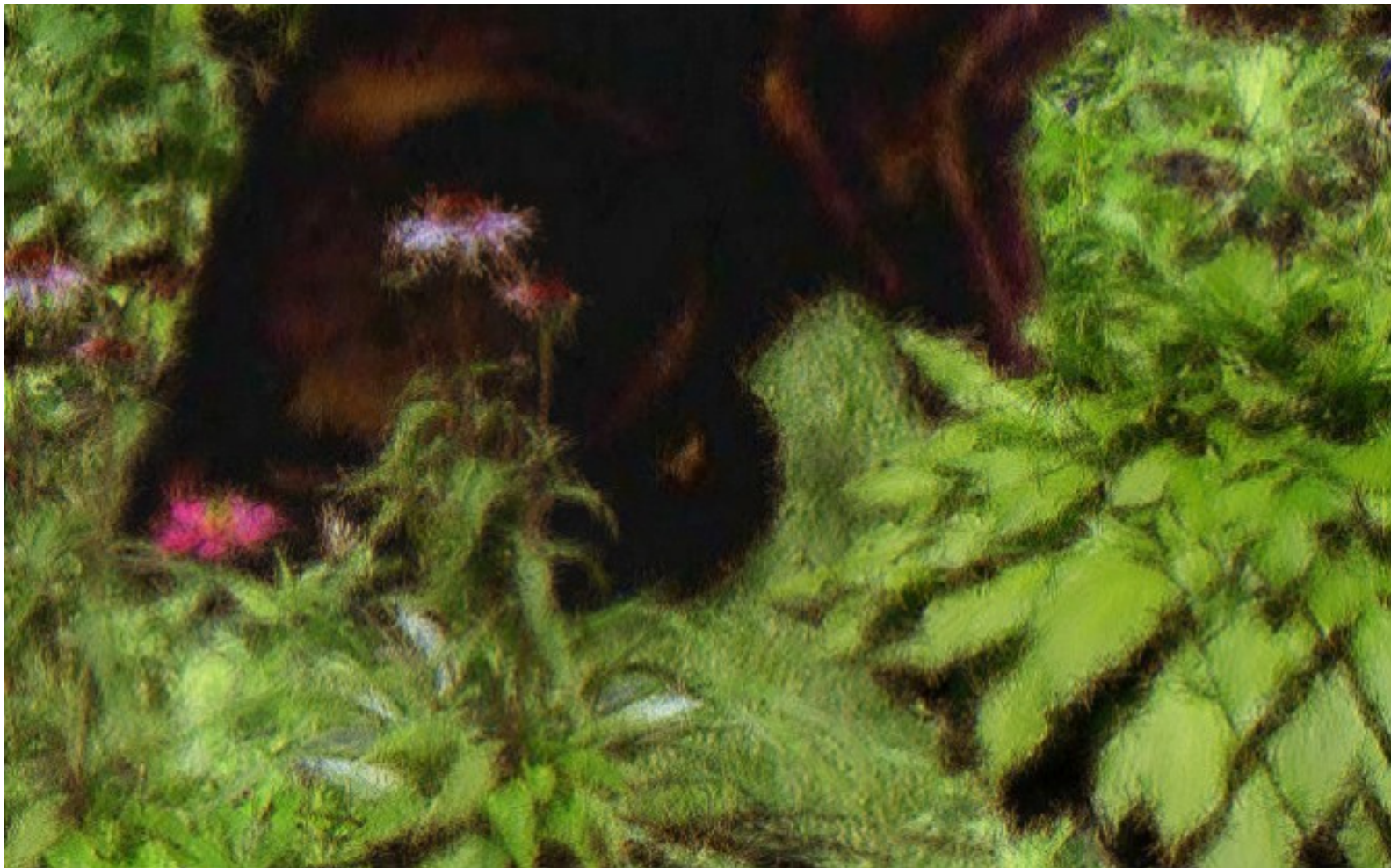
"Yes, well, of course I was upset. What did you expect? I'd paid a hefty fee to have Chatters serviced by the perfect sire and what happened? Trojan got in first."

"Well, I'm sure that book you wrote about Trojan's exploits more than paid you back."

Hazel smiled. "I'm doing quite well out of *The Trojan Horse*."



*The Trojan Horse*  
by  
Hazel Patton



"So what are you writing now?"

Hazel grinned. "I've got a couple on the boil. Samantha will star in *Lady Chatterley's Daughter*." Both of them turned to look at the cat sprawled out on the window seat. Except for the eyes she was the image of her mother. Those emerald green eyes though, were all Trojan. Hazel nodded towards the cat sprawled out in front of the fire. He was a very big cat, something like a Maine Coon cat, but with his mother's Siamese points and her blue eyes. "While Tiger gets to appear in his own story, *Cat On a Hot Tin Roof*."

Caroline giggled. "I'm not sure I want to know what inspired you to pick that title."

"It's quite innocent, Caroline. It was a hot summer, and there is this tin roof . . ."

Caroline held up her hands. "Don't tell me. I want it to be a surprise when I read it, but tell me. How can you write a romance about Tiger? I mean, didn't you take him to Dr. Blocker to have him, you know, fixed?"

"Artistic license, Caroline, artistic license."

\* \* \*

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# Stepping Up

Written by Jack Carroll

*American Electric Works*

*The president's office*

7:30 PM

Gottfried voiced an untranslatable grunt of frustration. "How on earth do they come up with *this*?" Landon looked at the page. "Hmm. Yes. You have every right to be confused, the author should have shown some intermediate steps. Well, let's walk through it . . .  
". . . so that's where equation 16 came from."

The wave equation is the prototypical example of a hyperbolic partial differential equation. In its simplest form, the wave equation refers to a scalar function  $u$  that satisfies: Bla Bla Bla.

$$\frac{\partial^2 u}{\partial t^2} = c^2 \nabla^2 u,$$

Gottfried mused, "I see. And from there it's not much of a leap to the wave equation. And from that, we get the speed of light, and radio, and everything else."

"Right."

"Why can't these books be available in Latin? Nobody can study all this new physics without coming to Grantville and learning English first." That was a half-mutter from Manfred von Ochsendorf.

Landon looked sidelong across the small conference table. Manfred was no pampered son of the nobility. His was a "bauer" von, and he worked as hard at his studies as anyone. On the other hand, he was young, and not the soul of patience when something wasn't the way it should be. "Very true," Landon said drily. "What are you going to do about it?"

"Professor! What do you mean by that?"

"Easy, Manfred. I wasn't making fun of you. Your question deserves a serious answer. So does mine.

"Sure, the textbooks and teaching guides for this course should be published in Latin. Then the subject could be taught anywhere in Europe. But just how is that going to happen? Think about it. When you and your classmates finish this course, you'll be the first scholars in history to understand both

electrodynamics and Latin. Unless you're willing to step up to the plate, it may not get done for a very long time."

"Step up to the . . . ?"

"You haven't heard that expression? It comes from baseball. Have you had time to watch a game? Well, when your side is at bat, and your turn comes, you step up to the plate and do the best you can for your team. A whole lot of people have been doing that, the last few years. For instance, I never expected to be a company president. Heck, I wasn't an electrical engineer before the Ring of Fire hit, either. "

"You weren't!" Anneke Decker said with surprise.

"No. You didn't know that? Well, let me tell you a little story.

"After I finished college in 1998, I came back to Grantville intending to teach math and physics. I got moved over to metal trades for a while, because the school was short in that department and I had the experience from working in Dad's machine shop a few summers. But I picked up one physics course, and I was preparing to teach calculus and analytic geometry to seniors in the fall, when everything got turned inside out.

"A couple of weeks after the Ring hit, I got word through the family grapevine that the power plant was looking for somebody who knew physics. Turned out they had a real situation on their hands.

"The deal was, the big turbine generator that came through with the Ring had enough spare parts to last maybe a year and a half. With survival pretty much riding on Grantville's technology edge, they stepped up with a plan to replace the turbine with a generator they could sustain.

"It was a scary time. When they added up the project schedule, it didn't work. They needed another electrical engineer to get everything done in time, and there wasn't one. So they hired me as an electrical engineering trainee.

"Well, that year was quite an experience. There were plenty of days I studied what I needed just in time for that day's work . . ."

### *The Landon and Sarah Reardon home*

#### **8:30 PM**

"Hello, honey. Supper's just about ready. Come here and give me a hug, then set the table, would you?"

"Mmm. It's good to be home."

Five minutes later they sat down to dinner. They chatted a little about the day's doings, and then came the words no husband wants to hear.

"Lan, we've got to talk."

Landon saw the way she leaned forward a little, with the tips of her slender fingers resting on the tablecloth. He tensed up a little, and quietly said, "All right. What is it?"

"I hardly see you all week. I understand what being the boss is like, you've got things going on at the plant all kinds of hours, and then there are the times the phone rings on a weekend. But the nights you advise the study groups, if I want to have dinner with you, I have to wait until 8:30 or 9 o'clock. By then a bear better not cross my path."

"I don't like it any better than you do. But we're still hanging by a thread around here. The power plant isn't living on borrowed time any more, but we're not up to building spares for some of the stuff feeding power to the neighborhoods yet, let alone filling all the orders from outside. And I'm still the only real double-E at the company. The electrical designers can't do everything. We can't wait a couple more

years for the school to get a pre-engineering curriculum going. If we can't at least bring in a couple of trainees real soon . . ."

"I understand all that. I teach social studies, so you don't have to tell me about the political fallout if the Prague job goes sour. But you know the old saying: 'If momma ain't happy, ain't nobody happy.' Well, I ain't happy. I'm not stuck at home, that's fine, but it's mostly the kids at school I see. And they're great. But they're not adult company. This isn't why we got married. At least, it's not why I married you. You're a great guy. I just want to see you."

"I want to see you too. Just sitting and reading with you, I feel at peace. But we're all racing to keep ahead of disaster, and AEW's right in the middle of it. What do you expect me to do?"

"I don't know. For pity's sake! You're an engineer! You brag about pushing out the corners of tradeoff curves. Take it as a problem. Think about it."

"All right, I will. You think about it too, huh? Let's go out for a walk. It's a beautiful night out."

*Two weeks later*



Sarah walked into the dining room with a coffee tray in her hands and a stack of social studies papers under her arm, just as Landon rinsed off the last fork and dropped it in the drying rack. Footsteps sounded on the porch. Landon answered the door as Sarah came up behind him.

"Hello, Gottfried!"

"Hello, Professor! Hello, Mrs. Reardon!"

"Hi, Manfred! Hi, Anneke! Oh, you must be Else. Come on in, everybody, and sit down."

With a flurry of books and chairs around the table, the session got under way.

"So what's causing problems tonight?"

"Well, here on page 216 . . ."

"Yeah, that's not as clear as it could be. The English is kinda convoluted . . ."

"Hey, Anneke, that slide rule looks new. Where'd you get it?"

"Kudzu Instruments made it for me. Your dad's shop cut the engraving template—I had to supply a CAD file."

"*Aluminum?*"

"My landlady had a leftover piece of strip from some repair job her husband did up-time."

"Gottfried, does this derivation make any sense to you?"

"*Ja*, I had to go over it a few times myself. The subscripts are defined three pages back . . ."

Sarah looked the soul of decorum, working her way through the school papers in front of her with a red pencil in her hand. Landon leaned over and whispered in her ear, "You gonna keep playing footsie with me under the table?"

She whispered back without cracking a smile, "You betcha, tiger."

The discussion went on for another hour.

As Sarah put down her pencil and stretched, and the students started to gather up their notes, Landon turned toward Manfred with a hint of a smile. "Well, Manfred, have you decided what you want to do about Latin physics books?"

A few minutes later, as the study group headed for the tram stop at the corner, Landon and Sarah sat down with the last of the coffee. She rested her hand on his shoulder.

"Your students are a good bunch. They're so bright and eager. A couple of my juniors might be like that in a few years. I'm glad I finally met them all."

"I'm glad you liked them, babe. Thanks again for stepping up."

\* \* \*

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# School Days, School Days, Dear Old Golden Rule Days

Written by Terry Howard

*February, 1635, Grantville*

It all started on the first day of school. Chaim was in the hallway when he heard a kid say, "Hey, Hans. Look! A Shirley Temple haircut!"

"What are you talkin' about?"



"The banana curls, just Like Shirley Temple on the T.V."

"Red, for an up-timer, you are such a dummy! Don't you know nothing? He's a Jew. Lots of Jews wear ear curls."

"Uh uh. The Abrabanel's don't."

"Hey, Shirley, are you a Jew?"

Chaim ignored him.

"Hey dumb ass, you with the curls—"

Chaim didn't answer him.

"Yeah, you're right, Hans. He ain't Shirley Temple. She could talk. This guy can't. He must be Buster Keeton." Chaim heard Hans laugh.

Red continued, "That's the silliest hat I ever saw anyone wear. Are you trying to be funny? Hey, Buster, where's the propeller? Ain't beanies supposed to have propellers?"

Chaim ducked into the classroom thinking that would end it. When he was hurrying back from lunch—he lived close by so he went home instead of bringing a lunch bucket or eating in the cafeteria which wasn't kosher—he heard a loud voice, "Look here comes Buster Keeton with Shirley Temple's banana curls."

The first day of school established an ongoing pattern.

*Early Winter, 1635*

"Class," Mrs. McDonald, said, "today we have a special treat for you. Mister Wiley has brought his

collections of arrowheads and other West Virginia Indian artifacts."

William Wiley gave a solid talk on Indians geared to a fourth grade level. Fragile items were held up for view and the durable stone projectile points were passed up and down the aisles. When he came to his favorite relic, he was ready to wrap up his twenty minute lecture before he started losing his audience.

When William was no older than the children in the class an old-timer gave him a small stone resembling a cat. He told William it was an Indian totem. William was never able to find any supportive references in literature on West Virginia's Indians to confirm it, but he had never stopped believing his primary source.

"This," he said holding it aloft, "is an Indian totem. A totem was a spirit guide. Like the belief in the Great Spirit it helped the Indians live in harmony with nature. They believed the totem would lead, help, and protect them. It was—"

"You mean like Chaim's golem," a young male voice called out. "Chaim says the rabbi in Prague made a statue that came to life and protected the Jews."

William was startled. He knew himself to be an open, accepting, tolerant man, except when it came to blatant stupidity. Like this.

His thoughts flashed back to all of the battles, some loud and sharp others quiet and lingering, he had over the years with his father, Enoch Wiley, the minister of the Free Presbyterian Church. He would have liked to think that if his Father had had a real education instead of some stupid correspondence course, he would have learned better. But he had to admit there were a lot of stupid men out there, some with doctorates in theology, taking advantage of other people's ignorance. How could anyone go through that much schooling with their eyes completely closed?

William blurted out the truth as he saw it. "It didn't happen any more than a totem actually guided the Indians." Realizing he had just put his foot in his mouth, he sought to smooth it over. "All religion is just mankind trying to explain what they don't understand. Then they use it to justify laws they make.

"Like the rule against eating pork. It's obvious to me, and it ought to be plain to anybody who will bother thinking about it, that when the Israelites were superstitious shepherds in the desert where there aren't a lot of pigs around or enough fuel to cook pork well, some of them got sick. That's when they made a rule against eating it. To enforce it, they blamed it on a deity. Now we know you have to cook pork completely so there is no reason to not eat it. But since it is a law of God, they're stuck with it."

The teacher spoke up before William could say another word. He had stopped talking about Indians and started talking about religion. The school board had decided the best way to teach American values was the same way it was done back home, by teaching American history. It did not matter if it was current events here and now or future history of a universe which no longer existed— or, at least, was no longer accessible if it did still exist. It was their history and they should be proud of it. Colonial history should teach the value of representative democracy, and the price of freedom. Indians were part of that history. Perhaps they might get a better deal in this world if what happened in the other world was not forgotten. But religion was another matter all together. School board policy was more than firm on the topic. It was not to be discussed below the high school level, except very cautiously as history in the most gentle, general, and strictly limited terms. There was no way she was going to let the lecture end in a question and answer session with the topic now involving religion.

"Thank you, Mister Wiley. Class, just as soon as all of our guest's things are passed back to the front, you may go to recess."

\* \* \*

The trickle of teasing avalanched on the playground.

"See, dweeb!" "Told you the golem was bull!" "Neener, neener, you and your stupid curls."

"Hey, look, it's a spring, *boing, boing,*" Hans said as he batted the bottom of Chaim's ear-lock to an uproar of laughter and giggles. Chaim turned away, red-faced, angry and wishing for a good comeback. As he walked away, Hans pushed him in the middle of his back. "Get lost, you little creep. Go play with the girls."

By the end of the day, Chaim decided he was never, ever coming back to school.

\* \* \*

"You must speak to Chaim. He refused to go to school this morning," Rachael said when Yankel got home from work a little early on Tuesday

Yankel looked up from the cup of hot broth his wife set before him. It was a cold winter's day. He had just walked home from work by way of the tanner's to make sure the book bindery would get enough fine-grained leather that looked alike to bind fifty matching copies of the *Siddur*. He could have ridden the trolley which ran out to the school and right past the house but riding the trolley cost money and the family had better things to do with money than to spend it riding trolleys. "Is he sick? Should we take him to the doctor?"

"No," she replied. "The other boys are teasing him."

Yankel's first thought was to take a belt and teach his son a lesson. How dare he skip school? How many families back home would do anything to give their sons schooling like Grantville's if they knew it existed? This was one of the reasons for accepting the Abrabanel's invitation to come to Grantville and Chaim would not go because he was teased! It was not like he was being robbed or beaten or he might be killed or his sister might be raped. It was only teasing.

Rachel saw his face. "You need to *speak* to him!" Her voice was firm. "This is not the old country. They do things differently here." She did not remind him of the neighbor, Herr Shultz, who was thrown in jail for beating his wife and children. When he got out he did it again and the children were taken away.

Yankel sighed. Grantville was a marvelous place full of wonders and luxuries beyond belief. But it was a different world with different ways. "I will speak to him when he comes in from playing."

"He is in his room. When he would not go to school I insisted he was sick and must stay in bed."

Yankel smiled. He was a lucky man. His parents had found him a wise wife, whom he loved, respected and admired. "I will speak to him." He stood, lifting his *shelchl* of soup. *Cup*, he corrected himself. *Think in English, Yankel. If you do not think in English you do not really know it and you need it to get ahead.*

\* \* \*

Chaim was on the top bunk reading. The lower bunk was shared by his two younger brothers who were outside playing. Three of Chaim's four cousins had after school jobs, the other one was likely reading in the library. Yudl seemed determined to read every book there. Yankel looked at his oldest child. They'd named him Abram when he was born. When he was three, he got so sick that they changed his name to Chaim, hoping the angel of death might not find him. Now the boy was ten and he loved to be active. Spending the day in bed was almost torture for him. "Chaim, you didn't go to school today! Why?" "Mother said I'm sick."

"Which she said when you wouldn't go to school! Why would you not go to school?" The silence lingered. "I'm waiting for an answer, Chaim."

"They tease me! They call my *peyot*—" He touched his ear-locks. "—banana curls. Only little girls wear banana curls. They call me dumb head for wearing a *yarmuka*, 'don't you know enough to take your hat off inside?' they ask. They treat me like I'm different!"

"You are different. You are Jewish. Even the Lord treats us differently." Yankel made himself use the English "Lord" instead of the Yiddish Hashem. He would never have used the more formal name, *Adonai*, except in prayer.

"The Abrabanel's do not wear *peyot*."

"They are Sephardi," Yankel said, not even trying to keep the distain from his voice. The Abrabanel's were Sephardic, Spanish, Jews who spoke Ladino. Chaim's family was Ashkenazi, German Jews and spoke Yiddish. The different customs of the Sephardi were, well, different. Yankel didn't care for them at all.

"They are Jews. If they don't have to wear them, why do I?"

"Chaim, it is written, 'Thou shalt not trim the corners of thy beard.'"

"I don't have a beard. Why do I have to have them?"

"Every male in this house has them except your youngest brother, and he will as soon as he has hair."

"The Abrabanel's do not. Jews do not have to have them. This is Grantville. Why do we have them?"

Yankel repressed a sigh. How do you explain to a child when "this is just the way things are" does not work? Still one must try. "Chaim, do you remember the movie we saw about Frankenstein's monster?" His son nodded. "What brought it to life?"

"Lightning."

"Which is electricity." Yankel pointed to the light bulb with his chin. The family burned electricity like it was gold. A light was never turned on until you needed it to tell a black thread from a white one at arm's length. Then it was left on only as long as necessary. A lighted room with no one in it just did not exist in Chaim's home. "Where does the electricity come from?"

"The power plant."

"So electricity is power. Now, how do you know an electrician?"

"They wear a hard hat. And they wear an orange vest with pockets for tools. The pole men wear climbing spikes."

"So you can tell a man who works with electrical power by the way he is dressed. Good. And the way he is dressed helps him do the job and helps protect him from harm, this man who is trained to work with power. Now, my son, have you forgotten, in less than three years you will be a man trained to handle power?"

"In three years I will be a man and read Torah in *shul*."

"Yes! And there is power."

"How?"

"The Torah contains the name of the Lord. There is power in the name. Why else did Jacob ask the name of whom he wrestled and was instead given a blessing? Because, there is power in names. We keep our heads covered because we are under the Lord. We wear *peyot* and a *tallith* because, like an orange vest, it tells the world we are men of power."

"It is not the same. Besides, they have priests."

Yankel made a noise of disparagement. "Untrained, or at best half-trained incompetents. Look at the mess they have made of Europe with their war over theology. We have real power!"

"It is not the same."

"Do you remember when you were seven and it was the feast of tabernacles? We were to eat our meals in the *succah* outside. But it was raining so hard the day Rabbi Elizar was to eat with us that we couldn't."

Chaim's face lit up. It was a story told many times. "Reb Elizar prayed and the rain stopped. He told us to eat quickly. We carried the food out and rushed through the meal. We were barely finished and back inside before all the rain he held back by prayer came down at once."

"As Elijah prayed and there was no rain in the time of Ahab. Then what happened on Mount Carmel? Elijah prayed fire down from heaven to consume the altar he had built. You know the story of Old Ehud who did not have anything to cook for the Sabbath. He prayed. Then he started a fire to boil water so he could let the fire go out after sundown and still cook in case some kind soul who might be bringing him food was running late? What happened?"

"Without fish, there is no Sabbath. A bird lost hold of a fish it was carrying and it fell down the chimney."

"The Lord has given power to the faithful. He calls on us to be obedient. We are to dress differently, eat differently and live differently. The word *kadosh*, we use it to mean holy, but really, it means separate. The job of a Jew is to make a separation between the sacred and the profane, between the Sabbath and the rest of the week, between kosher food and *treif* food, and between Jews and non-Jews."

"But Father, they pick on me."

"What happened when the children were teasing Elisha about his bald head?"

"Two she-bears came out of the wilderness and killed them."

"You see? When the time is right, you will see the vengeance of the Lord. Tomorrow you will go to school. You will study hard. One day you will make a business. Then these boy's who tease you will need a job or credit or charity and they will come to you hat in hand. The Lord has promised to bless us, his chosen people. He has given us power. But we must keep his Laws." Yankel thought he had made the point and the discussion was over.



"You mean like the Lord has blessed the Abrabanel's?"

"Yes!"

"But, Papa, they do not wear *peyot*."

Yankel wanted to scream, but didn't. "Chaim, we are men of power. We are to dress accordingly. The Golem of Prague? How was it brought to life? Was it not when Rabbi Loeb, its creator, put the Name of God on a piece of parchment and put it under the creature's tongue? It was the power of the Name which brought it to life like the lightning did for Frankenstein."

"It is just a dumb story, Papa." The line was delivered with the pure disdain of a child.

"Yes, the golem is just a story," Yankel said. "But I would not call it dumb." What he didn't say was that when he was Chaim's age, he still believed in the golem. The boy should have had the pleasure of believing for another year or two. That anyone should claim it was a dumb story bothered him. Here in Grantville with its mechanical marvels, the story of the golem offered a vehicle to decipher what the Law required of them. It was illegal to walk farther than a Sabbath's journey on the day of rest, as it was illegal to work your ox on the Sabbath, but was it right to run a non-living engine? Was it breaking Shabbat to illuminate with electricity when no fire need be kindled? Where else but the story of the golem would they look for a template?

"Mister Wiley called it dumb."

"Who is Mister Wiley?"

"The guest speaker at school yesterday."

"Oh?" Yankel responded.

"Yes," Chaim said. "He also said there was no longer any need to keep kosher. It's just superstition. We made it up, anyway."

Yankel became still in his soul. A knife was being thrust at the very heart of his child. "It is just superstition? Chaim? How can it be just superstition when it is the command of the Lord? How can we believe and not be obedient? Is belief in the Lord just a stupid superstition?"

"I don't know, Papa. It is what the man said. You will have to ask him."

"I hear you!" Then Yankel asked, "Did this guest speaker talk to Yudl's class also?" Yudl was also in fourth grade but he was in another class.

"Yes, Papa."

"I will speak to someone about this speaker." Quietly, he left the boys' room, but inside, in spite of his calm appearance, there was a raging storm.

Back in the kitchen Rachael was waiting.

"I must go to the school. I need to speak to Yudl."

"Is it that bad?" she asked. "It is cold outside and Yudl will be home for supper."

"It's worse. They would teach our sons that our beliefs are stupid superstitions and there is no need to be obedient to the Law. How would they like it if a Jewish teacher told their children Jesus did not crawl out of the grave or fly away, but the body was stolen and his people made the whole thing up? Chaim was told we were stupid and superstitious for keeping kosher. This we cannot allow."

Yankel did not want to wait. He did not want to face his older brother before he had talked to his nephew and knew just how bad it was. He had persuaded his brother to except the Abrabanel's invitation to move to Grantville. "Yes, it is a long way from here but the Abrabanel's say it is safe there. They say our children will receive an education the likes of which is to be had no where else. They are printing in Hebrew. They promise we will have enough work to stay busy all of the time." Now this happened! He wanted to talk to Yudl to assure him this man Wiley was wrong. "I need to talk to Yudl. He will be in the library at the school. I am going to the school."

In the library, Yankel saw a man setting up a display in the glass cases. He recognized an Indian war bonnet from a movie of the week. Talking to Yudl was suddenly sidetracked.

"Excuse me, are you Mister Wiley?" From there the conversation became loud and heated and went down hill in a hurry.

\* \* \*

Victor Saluzzo, the high school principal, was present at an early Wednesday morning breakfast meeting of the three principals and Edgar Paxton. Edgar was the Superintendent of Schools and had arranged the meeting over the phone late the night before.

"Guys, thanks for coming. We've got a situation which could turn real ugly, if we don't get a handle on it right now. Loren, why don't you start by telling us about what happened?"

Loren Reading, the principal at Blackshire Elementary, took a deep breath. "William Wiley was giving his Indian arrowhead speech to the fourth grade like he does. Well, the golem of Prague came up in one of the classes."

"You'd better go over what that is again," Edgar said.

"Well, less than a hundred years ago in Prague, a rabbi made a statue out of clay and brought it to life, or so the story goes. Part of the problem, apparently, is that at least one Jewish family let the kids believe in it like some people do with Santa Claus."

"Loren, back up-time there are rabbis who say it was real," Victor chipped in.

"You're kidding?"

"Nope."

"Well, anyway, the golem came up, and William said it didn't happen. Then he said the Jews made up

kosher, and everybody made up God. I didn't find any of this out until I called Mrs. McDonald, after what happened in the library.

"She's a fine woman, and I am grateful she came out of retirement to help us out and all, but handling so many young children day in and day out just exhausts her. I saw her out in the parking lot looking for her car. Someone had to tell her it was home on blocks and she should take the trolley."

"I've been known to misplace my car in a parking lot myself," Victor said.

Loren shook his head. "Nonetheless, she should have reported what happened. But she didn't. We've got a new trainee for next year, thank goodness, so she can start taking it easier again."

"Tell us about what happened in the library, Loren," Edgar prompted. "Stay on topic, please."

"Well, Chaim Buchbinder's father, Yankel, came to the library while William Wiley was setting up a display in the cases. I heard them yelling at each other all the way down to the office. The young lady working as the after school librarian is great with kids, but she didn't know what to do with two grown men. I told William to go home. Then I tried to get Yankel to calm down and talk to me, but he froze up like a suspect talking to a cop. When he left, I called his son's teacher to find out what was going on.

"I figure I'll tell William to take his display on home. I don't need to be explaining to parents why someone who is telling their kids God is just make-believe is still hanging around the school."

"Loren," Edgar said, "that's a problem. I know William Wiley better than you do. If you cut him off and don't let him display his arrowheads, he'll make a free speech issue out of it like you don't want to ever see! He can do it. The man is good at causing a ruckus. He knows every button to push and just the right way to do it."

"Well, I can't have him around the kids. What if it comes up again?"

"How about this?" Victor offered. "We ask him to move the display to the high school. Tell him more people will see it there and I'll tell Verlinda to make sure he has plenty of help and not to leave his side all the time he's there. That should keep him out of trouble."

"Let's try it. I just wanted to give you guys a head's up before the phones start ringing off the hook. Stress that he is not a teacher and that he won't be coming back. He's going to scream bloody murder when he hears, but it can't be helped. I don't know what else we can do. But I'm sure we haven't heard the end of it."

\* \* \*

Later in the morning, the secretary knocked on Loren's office door. "Sir, you have visitors."

A quiet student, with an even quieter parent, was shepherded into the principal's office by one of the younger Abrabanel associates.

The shepherd made the introductions. "Mr. Reading, I am Isaac Abrabanel. This is Yankel Buchbinder and this is his son, Chaim."

The air was tense. Loren sought to ease the situation. "I know Chaim. There is a chair in the library which will not let anyone else sit down in it except him." The joke could not have fallen flatter in a punch press. Besides he was confusing Chaim and his cousin Yudl.

Loren watched as Isaac looked at Yankel and waited for the man to screw up his courage and speak.

"Principal Reading, sir . . ." An obviously uncomfortable Yankel paused while he shifted from foot to foot. He looked at his backup. Isaac nodded. "We have a problem, sir." Yankel paused again and then blurted out, "I can no longer allow Chaim to attend school."

"Please, sit down and tell me about it."

When the three of them were seated, Loren saw Yankel once again look to his guide. The boy's father struggled through what Loren knew was strange new world where one could bluntly criticize the head of a school, a government official even, to his face. Isaac once again nodded.

Loren wished that Jacob Hanauer was there. Between his duties as Rabbi of the Ashkenazic Synagogue, teacher in the Hebrew school and publisher of elementary reading books, Jacob had quit his teaching post at Blackshire School before the Buchbinders arrived in town. As an experienced teacher, down-timer, a Jew and a rabbi, Jacob would have been a huge help.

Yankel quietly said, "Sir, I have talked to your teacher, Mr. Wiley. It is my opinion he is not morally qualified to teach children."

"That is quite a statement. Let me point out Mr. Wiley is a guest speaker, not a teacher." Loren wanted to distance the school from the problem.

"Sir, he told my son he did not need to observe the Law as the Lord told us to observe them. When I asked if he would want a Jewish teacher telling his children Jesus did not rise from the dead, he laughed and said he wished someone would tell them the truth. Such a man has no business molding the lives of children."

Loren asked the boy, "Did he tell you not to observe the laws of God?"

Chaim, hesitated and then nodded.

"Tell me about it. How did the subject come up?"

Chaim gave him a full, if slanted, account, focusing more on being teased on the playground afterwards than anything else.

"I see. This teasing, did it happen before Mister Wiley spoke to your class?" Loren asked.

"Yes sir, but not as badly," Chaim replied.

Loren gently grilled the lad for a bit more and found out the teasing was ongoing from the beginning of the school year, then asked the boy to step out of the room.

"Gentlemen," Loren said, "let me assure you, Mister Wiley will be addressed. He is not a school employee and does not represent us in any way and will not be speaking to our classes again." Loren knew that up-time William might have gotten away with being a guest in a public school with his attitude. Here and now, with the prevailing public opinion, it was a large problem just waiting to happen. With civil strife along religious lines rampant in Europe, strict neutrality and respect had to be observed in the schools. It was best to avoid the topic all together.

This still left a second matter to be addressed. Loren made hard eye contact with Yankel. "Mr. Buchbinder, I am embarrassed about this. Mrs. McDonald is a fine teacher from the old school. She was retired and returned to help out with the massive overload. This is her last year. Still, how this slipped past everybody without it being noticed and reported . . . well, if it had been reported something would have been done. As it is . . . I suggest you tell your son that the next time he is teased, he should poke his tormenter in the nose."

Complete astonishment washed over Yankel's face. "But, Chaim will get in trouble! To, to . . . you are telling me that my son should hit a Christian! Impossible. Dangerous, more dangerous than I can say. What would happen . . . he would be killed!"

"He'll end up in detention after school for an hour a day for a week, where he will have to sit quietly or

read." Loren smiled as if to say that was no real punishment to a student like Chaim. "Yes, it will end up on his school records, but this sort of thing is expected. It shows character and is even a good thing, as long as it is rare and it is clear he did not start it. After he's stood up to them a few times, the teasing will stop."

Isaac said, "Yankel, why don't you and Chaim head back to the shop? We will discuss whether or not he will go back to school when I catch up with you."

When Yankel was out of the room, Isaac said, "Principal Reading, I need to impress on you just how seriously this matter is being taken by the Jewish community. I hope you are aware this sort of thing could force us to expand our Hebrew school into a full-time school." Grantville's synagogue, a block from the middle school, had a Hebrew school where Jewish kids took after-school Hebrew lessons four days a week. "The Lutherans have, after all. Even the Catholics might do so.

"This is something we will do if we have to, but we really do not want to. So far, we have been satisfied with our experiment supplementing the public school with a part-time Hebrew school, and we do not want to retreat from the larger community.

"When we invited Yankel's family to come here because we needed book binders to work with our printer, we guaranteed them full-time employment, good housing, and education for their children. There is no way we could equal the quality of your public schools for the teaching of secular subjects."

"Mister Abrabanel, let me assure you again, this was a fluke. It should not have happened. I cannot conceive of something like it happening again. Likewise since it was completely unforeseen, any future event—" Loren held both his hand palms up about shoulder high and shrugged. "—will be equally unforeseeable. We have taken firm steps to see to it that any foreseeable problem has been addressed. The only thing you can do to help at this point is to reassure the family and encourage them to move on."

\* \* \*



Chaim came home from school the next day with sore knuckles, an eye growing blacker by the hour and a smile on his fat lips.

\* \* \*

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# Cinco de Mayo . . . er, der Fünfte Mai

**Written by Edith Wild**

"So what the heck is a taco, really?" asked Maria, David's girlfriend.



It was with great fanfare that the owners of the Thuringen Gardens added real honest-to-god tacos to their menu in May of 1634. May 5th, *Cinco de Mayo*, was to be celebrated with a mariachi band, Mexican food, piñatas, Mexican-style candies, cotton candy and German beer. Of course, the Gardens was packed with anyone in Grantville who was addicted to tacos. This included David Dominic Villareal and company.

"They're . . . well, they're just good," David said. "I've missed them, missed them a lot. The fast food kind, that is. Mom does great spaghetti, but her tacos . . . well, never mind. It's nice to be able to go to a restaurant and order what you want, don't you think?"

Maria held on to David's hand. They were the usual party of twelve, David, Maria, some of his friends and their girlfriends. They were normally in the Gardens at least twice a week, often more, drinking beer and eating typical Gardens' food. Maria did like sauerkraut and sausages, so why tacos? David had gotten her to agree to try them, even though she still had her doubts.

"May fifth will be forever different," David said. "It's time to celebrate our heritage as Mexican Americans, not just Thanksgiving and Fourth of July."

The platters of tacos were rolled out and set on the tables. David's eyes lit up like two roman candles at a fireworks show.

"Tacos! Tacos!" he said. "Look, Maria"

She did. Hugely layered, with beef, spring greens, baby tomatoes, shredded cheddar cheese, sour cream and hot sauce on tortillas the size of dinner plates.

"Pico de gallo!" David exclaimed. "I sure miss guacamole, though. But you can't ship in avocados yet."

David looked like he'd died and gone to heaven. The beer steins, enormous things, were all loaded with a local pilsner. Maria felt aghast at the mound of food and could not for the life of her figure out why David liked the tacos so much. They smelled funny. There was a burning sensation in the air, but no flames. David was sweating profusely and appeared to be in pain but washed it away with more pilsner. Maria picked at her taco, rolled her eyes and shuddered at the thought of eating anything strange looking. It was not lady-like, nor particularly practical. "We had tacos for dinner and I couldn't eat

them," she thought.

The music was another element; it was so different. The mariachi band was really not Mexican but they played the music, fast and sweet and romantic, or so David whispered into her ear. The band was even dressed authentically, in Jalisco costumes David called them. They wore huge sombreros, and silver embroidered velvet suits and the band even had a *viheula* and a *guitarron*. Maria could see that David recognized all of the men who played so fast and furiously.



David was grinning ear to ear at her like the silly ass he was.

Then he was poking Maria in her side a tad, encouraging her to try the stupid taco. Well, maybe it wouldn't be so bad. No sour cream, she'd stick with that. A little of the beef, perhaps some greens and some cheese. Pico de gallo . . . Maria hesitated. It had tomatoes in it. She was still not sure exactly how she felt about those, either.

Hesitant, Maria lifted the taco to her lips. There were waves and waves of fire emanating from it or seeming to . . . she took one small bite. At first there was not any sensation other than maybe it was really warm in the Gardens. Then the fire hit and Maria gasped, grasped her stein of pilsner and swallowed. She thought that half of the stein's contents had gone down her throat. She was coughing a bit and sputtering . . . but found herself reaching for more taco.

David was laughing and singing and clapping in time with the mariachi band. Then when the song was over, David, on bended knee, grasped her hand and slid a sparkling diamond ring on her left hand ring finger . . . "White gold—" she heard him say "—so as not to compete with your beauty."

David smiled. He got up and slid back into his seat, then picked up his fork and started eating more taco. Another band was playing a song, "The Cherry Tree" with a hard rhythm, a line of thirty pairs of men and women were on the dance floor dancing the *Seguidilla* . . .

Maria thought, "Oh my God. I'm going to get married!"

There was so much going on at the same moment. Stein after stein was filled with beer. One group of men was trying to sing "Eine Prosit" to the mariachi band's tunes. Two down-timer men in their group still didn't want more than a bite of taco; their faces said "no way ever again." It was one thing to bite your food; it was another to have it bite back.

Arthur Esslies had actually spat it out and had stomped out of the Gardens and was chased after by another down-timer, Felix Brandt, who yelled, "Coward! It is good food! You dolt!"

The whole building was almost vibrating with music and dancing and singing.

A whole bunch of construction folk wandered in wanting the usual meal. They were rapidly converted to

the idea that tacos were king. Then it was time for the piñatas to be beaten open and for the karaoke contest to begin. So the DJ set up and a contest got going. There was more beer and flan for dessert.



Maria thought, "I have a fiancé." She looked at David intently: handsome, smart and silly and up-timer. "Do you want to dance, darling?"

He smiled. "Why not, babe?"

Conversion to American ways and food was an interesting process, Maria decided. She looked at her ring again. Maybe it was a step in the right direction.

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# Joseph Hanauer, Part Three: All Creatures Stand in Judgment

Written by Douglas W. Jones

*10th of Tamuz, 5391 ( July 10, 1631 )*

The trip by cart from Grantville to a wooded hillside above Magdala had only taken a day. Seen from the hillside, the village looked large. Yossie had expected Magdala to be a tiny place, but if it had been walled, he would have called it a small town without hesitation.



After a month's rest, the old horse had recovered from the trip east from Hanau. They had followed the good road north up the broad Saale valley almost to Jena. From there, they had turned west to climb up a side valley to the broad plains around Magdala. Where the slopes of the valley had been dominated by vineyards and orchards, the plains around Magdala were cropland, with hedgerows dividing fields. Aside from the trees along the stream north of Magdala, the only trees were on the low forested hills rising above the croplands.

Yossie had hoped that they would spend Wednesday night in Magdala, but Thomas had insisted that they stay in the woods to the east. Yossie had eaten cold meals and slept under the same cart often enough on the road from Hanau, but the night had been uncomfortable. After a month living with the Adduccis, he'd grown a bit spoiled.

"Tell me again," Yossie asked, as he and Thomas ate a breakfast of cold sausage and bread. "Why

couldn't we spend the night in Magdala? Yesterday, that man in Bucha said that half the Imperials in Weimar had gone north to chase the Swedes."

"Right," Thomas replied. "But I don't believe him. He also said things were so bad that honest townsmen would rob a stranger for the shirt on his back. Foragers have stripped the land, and I'll bet that we're not far behind the stragglers who burned that village we passed. Best we not tempt anyone."

As they pulled out of the woods Thursday morning, Yossie remembered how the trip had started. "Those Papist scum murdered my Maria," Thomas had said, glaring at the two Bavarians who'd been assigned to the Murphy's Run forge.

"Where is she buried?" Yossie had asked, trying to be sympathetic.

"Buried!" Thomas had barked. "Do wolves bury their prey? I saw those beasts throw my poor Maria into a ditch." His voice had faded to a whisper. "I could do nothing, I tell you."

When Thomas had asked Yossie to help bury his daughter, Yossie hadn't said yes immediately. As they drove across the flat cropland toward Magdala, Yossie thought over the advice he'd received from his companions.

A passage from the Talmud had come to mind after Thomas had asked for Yossie's help. It was reprinted in the prayer-book at the start of the morning prayers.

"Of these things a man may eat the fruit in this world while the principal remains in the world to come: Honoring father and mother, acts of kindness, timely attendance at morning and evening prayers in the house of study, providing for guests, visiting the sick, providing for a bride, escorting the dead, deep prayer, and bringing peace between a man and his fellow, but the study of Torah is equivalent to all."

Escorting the dead to the grave, of course, was the subject that dominated Yossie's thoughts. He knew that it would also be an act of kindness to help Thomas, and that it could help make peace between Thomas and the two Bavarians.

When he'd asked his sister Basiya's advice, she'd shocked him. "Thomas' daughter was killed for *kiddush ha-Shem*," she'd said, flatly. The term referred to martyrs who'd died for the sanctification of God's holy name.

"But she was Lutheran," Yossie had objected.

"If soldiers had come to our home because we lived in the Jewish quarter, and if they'd murdered me, you'd say I died for *kiddush Ha-Shem*. Soldiers did come to his house because he lived in a Lutheran town and they did kill his daughter. How is it different?"

"So you want me to go?"

"No," she'd replied. "I'm afraid you'll be hurt. But I think I'd find it hard to say no if I was a man. Please be careful."

Yakov's advice had been no surprise. "These things have no fixed measure," the rabbi had quoted, and then changed the subject. That Talmud quotation was from the same section of the prayer-book that Yossie had thought of when Thomas first asked his help. The meaning was clear enough. Helping Thomas would be good, but Yossie was under no obligation.



When Randolph Adducci heard what Yossie was planning, he'd gone over to the locked cabinet where he kept his guns and returned with an American pistol, a *revolver*, he'd called it. Randolph had spent that evening and the next teaching Yossie to shoot the pistol and to care for the mechanism.

Randolph's wife Paulette had said nothing, but just before they left, she'd pressed a book into his hands. It was black, with a red ribbon bookmark and a gold cross on the cover. Yossie had felt uncomfortable taking such an obviously Christian book, but he couldn't embarrass her by refusing it.

\* \* \*

As they drove between the hedgerows toward Magdala, the village seemed to grow in size. The inward-facing houses around the village perimeter were packed so closely that they almost formed a wall. Many houses had outbuildings behind them, and low walls joined those, forming an outer defense perimeter.

"Who are you and what do you want?" a militiaman demanded as they followed the road between two houses.

"Until a month ago, I lived here," Thomas replied, looking closely at the man. "Heinrich, don't you remember me?"

The militiaman peered. "Thomas? The new smith? I thought they killed you." He paused, looking wary. "There's nothing left here for you. After the fire, there were thieves. They sifted the ashes for anything of value." He glanced at Yossie. "Who's your friend?"

Yossie's attention was on the village as much as it was on the conversation. The houses on the near side of Magdala were mostly intact, but on the far side of the village square, all he could see was ruin.

"Joseph Hanauer," Thomas said, in answer to the guard's question. "He's come with me from beyond Rudolstadt to help. I don't want anything from Magdala but to see that my daughter is buried properly."

"We buried most of the dead. Some were burned, though, and all we could do is guess who they were. Where did your daughter die?"

"Maria was washing clothes in the stream when they came," Thomas said, pointing northwest, toward Weimar. "I saw, well, my wife saw it all. Maria ran south, but the Imperials got between her and the village."

Yossie could sense the tension in Thomas' voice. "As God is in heaven, I tried . . . They would have

killed us," he said, sputtering to a stop.

"Where did she die?" the guard asked, almost gently.

"To the west, in the low pasture."

"Then she may still be there," the guard said. "The Imperials took the cattle, so nobody goes there anymore. Go, and God be with you."

They passed the ruin of the smithy on their way out of Magdala. The fire had been so intense that the chimney over the forge had fallen. "That's where I was when they came," Thomas said, and then fell silent.

They followed a grassy lane to the west. "Maria tried to run, but the open fields offered no shelter." Thomas said. "My wife saw them first, we ran to try to help, and then . . ." He fell silent for a moment. "See the willows ahead? She tried to take cover there."

The willows grew along a shallow ditch through idle pasture land beyond the village fields. Even if Thomas had not been there, the body would not have been hard to find. The buzz of flies attracted Yossie's attention to one clump of willows, and the smell of decay hung in the air as they approached the ditch.

"Maria," Thomas whispered, and then stopped, frozen, staring.

Her body was half submerged in the ditch. She was lying face down, and her clothing covered everything that was above the water. That didn't stop the flies.

"I've never," Thomas started to say, and then fell silent again.

Yossie had no experience in such matters, but Rabbi Yakov had served for years in Hanau's Jewish burial society. "We should wash her body," he said. "Let's lift her onto the back of the cart first."

They used a bucket to pour clean water over the body, washing away many of the maggots, and then set to work dressing it in a robe Thomas had bought at Grantville's Value Market. That was the hardest part of the job, at least from a physical perspective. The body was on the verge of falling apart. If it hadn't been for the clothing, the corpse might well have come apart when they lifted it from the water. They ended up simply rolling the body onto the robe and then wrapping it up, without even trying to fit the arms into the sleeves.

By rights, Yossie knew that women ought to prepare a woman for the grave. By rights, she ought not have been left to decay, of course, and by rights the burial should have been immediate, not weeks later. Logic told him that it was better for men to do the job than nobody, but still, the work made him very uncomfortable.

"We ought to say something," Thomas said, after they washed their hands in clean water taken from upstream.

Yossie hesitated. The only prayer that came to mind was in Hebrew, a prayer for martyred congregations from the Sabbath liturgy. There was something appropriate from the funeral liturgy, but he hadn't attended enough funerals to memorize it.

"Merciful Father who sits in heaven," he began his halting translation. "Remember with mercy the saintly and the righteous and the innocent and the holy woman who died as a martyr for your holy name." Yossie paused, trying to think through the next sentence. "With love and friendship she lived and died. Faster than eagles and stronger than lions she did the Lord's will.

"Remember her, Lord, among the righteous of this world. Avenge the blood of Your servant." He fell

silent at that point. The next part of the prayer was too complex to translate without pen and paper.

As Yossie came to a stop, Thomas spoke. "In Jesus name, Amen. Thank you, Joseph. Let's go."

Yossie was shocked to hear what he considered an idolatrous ending added to a Jewish prayer. Turning back toward Magdala to hide his reaction, he faced a new shock. Where the sky to the east had been clear, there was a distant pillar of smoke rising over the hedgerows.

As they rode up out of the marshy pasture into the cropland, they could see that the smoke came from beyond Magdala somewhere to the southeast. The smoke clearly rose before the more distant hills, though, so it was not more than a few miles beyond the village.

The burnt-out block where the smithy had been faced them. As they drove toward the ruins, a boy stepped out.

"Thomas the Smith?" the boy asked, and then went on without waiting for an answer. "I remember you. My father said to tell you—to tell you that there are raiders in Gottern, to tell you that they will be here next. Get away. Go south on the Blankenhain road."

"And I remember you, Martin," Thomas said. "How do we get to Rudolstadt if we go that way?"

"I don't know," the boy said. "But the raiders are coming up from the east, and we have to empty the village fast to avoid trouble. You should go quickly."

Once they made their way out of Magdala, the road south was no worse than the road up from the Saale valley to the east. There were small villages every mile or two along the road. Some were empty ruins, and none were free of signs of war.

Their view of the column of smoke to the east was obstructed only by hedgerows as they rode through the fields. At times, the hedges along the road were high enough to block the view, but there were few trees to block the distant view when their perch on the cart allowed them to see over the hedges.

After half an hour, the road began to veer west, with low wooded hills to the south. In another half hour, they reached the large village of Blankenhain. The place was as battered as Magdala, and again, they were met by a member of the local militia.

The man approached warily, brandishing a pike.

"Which road to Rudolstadt," Thomas called out, before the man came close enough to challenge them.

"That way," the man said, pointing south. He stopped and sniffed distastefully. "What's in your wagon?"

"My daughter," Thomas said, "dead a month. We're taking her to her grave. Is the way south safe?"

The man backed away a pace. "No roads are safe, but we've heard no bad news in the last few days."

"We just fled raiders coming at Magdala from the east," Thomas said. "They must have been close behind us on the road up from the Saale."

"They're probably going to Weimar," the man said. "You'd best be going on south."

The road onward from Blankenhain was better than the road from Magdala, but not as good as the road they'd followed north up the Saale valley. They were still in a land of wide fields and hedgerows, with few trees. The forested hills to the east and west were higher than the hills around Magdala, but not enough to create a well defined valley.

As they drove on, Yossie's attention slowly turned from the raiders somewhere behind to the angel of death hovering over the cart. It was not right to ignore the body of Thomas' daughter Maria. The right thing to do when watching over the dead is to chant psalms. Yossie's prayer-book held many psalms, and he knew a good number of those by heart. They were all in Hebrew, though, and he didn't dare let

Thomas see text in that language or hear him chant them in their traditional form.

As he chanted under his breath, he slowly grew aware that Thomas was doing something very similar, although louder and with German words and a Christian sounding melody. Yossie still had the Christian Book that had been pressed into his hands, and it suddenly struck him that it might do Thomas some good.

"Thomas, Frau Paulette gave me this before we left Grantville," he said, pulling the book out of his bag.

"A Bible, in English?" Thomas said, handing Yossie the reins and taking the book. "She is your landlord? Didn't you say she was Catholic?"

"Yes." Yossie hadn't even dared open the book, but now, as Thomas leafed through it, he saw that it was printed in small type on incredibly fine paper.

Thomas had complained on occasion about his eyesight, and as he held the book, he held it close, making it clear that he was nearsighted.

"Thomas, there is a red ribbon, see what it marks."

"The letters are very small," Thomas said. "It is in Italian letters, too." He then began to read, in very halting English. "*The Lord ruleth me. I shall want nothing. He hath set me in a place of pasture. He hath brought me up, on the water of refreshment . . .*"

After a few lines, just as Yossie began to recognize the psalm, despite the strange language, Thomas stopped. "I know this," he said, and then recited the same psalm in German.

Thomas began to work through the psalm line by line, reciting the German after laboring through each line in English. All the while, Yossie listened in wonder. He too knew the psalm. It was not part of the daily liturgy, not one that he had memorized by regular recitation, but he knew it. He would never have imagined that it would be the one passage an American Catholic would mark or that a German Protestant would know by heart.

They were leaving the high plains, descending into a gentle south-trending valley as they studied the Book of Psalms. The fields of the plains behind them were replaced by orchards, vineyards and pastures as the land grew steeper.

Their study was abruptly interrupted by the clatter of hooves and distant yells. The road curved around a hillside that blocked their view of whatever was happening.

They had hardly packed away the Bible when a wagon came around the bend toward them. It was a heavy freight wagon pulled by four lunging horses. There were men running beside the wagon and more men riding it, armed with pikes and guns.

Yossie froze. He had the reins, but there was no escape. The cart was trapped on the narrow road between a steep bank and a hedge. There was no place to pull off so the wagon could pass. The old horse stopped of its own accord as the heavy wagon came closer.

"What do we do?" Yossie asked. He still had one hand in the bag where he'd just put the Bible. His fingers brushed the cold steel of Herr Adducci's pistol.

"I don't know," Thomas said.

The approaching team slowed and a man jumped off to run forward. "Off the road!" he yelled, a huge pistol in his hand.

Four horsemen came around the shoulder of the hill at a gallop, obviously chasing the heavy wagon. Yossie's attention was on the little pistol in his hand and on and the gunman reaching for their horse's

bridle.

"I said, out of the way," the man yelled, hauling the horse roughly to the downhill side of the road and giving it a hard slap.

The horse started, and the cart came perilously close to tumbling into the ancient hedgerow below the road. If they'd had a young spirited horse, things might have gone badly, but theirs was an old nag, sure footed, patient, and slow to respond.

Ahead, most of the other men had jumped off the wagon to form a skirmish line facing the approaching horsemen. The air was split by the sound of gunfire, both long guns and pistols.

"Off the road, you swine," the gunman said, raising his pistol. Behind him, a pikeman came their way. There was a roar, two gunshots in quick succession. The man with the pistol had fired, a loud booming shot, and Yossie felt a great jerk in his arm. The other shot had been the sharp high crack of an American gun, and it took Yossie a moment to realize that he'd fired the pistol in his hand. Neither shot had struck a thing. The jerk had been nothing more than the recoil.

The pikeman was still coming, so Yossie held the pistol with both hands, as Herr Adducci had taught him, and fired a second time.

He missed the pikeman, but one of the freight wagon's lead horses reared up and screamed, lashing out at the pikeman from behind before it slowly collapsed to the ground.

Their old horse was shuffling and prancing nervously. For a few seconds, Yossie's attention was fully taken with controlling the horse. The way forward was blocked by the wagon, and their horse was hemmed in on the sides by the hedge and the fallen horse.

By the time the horse had calmed. Thomas was standing by the cart with a pike in hand, holding back the gunman while the downed pikeman sat groaning on the ground between them.

"Bavarian scum," Thomas said, as Yossie took the gunman's big wheel-lock pistol.

As he looked around, Yossie saw that things had changed. Half of the men who'd been on the cart were gone, and the others, aside from the two nearest, were standing dejectedly under the guard of two of the cavalrymen.

The other two cavalrymen had spurred their horses up the bank. One paused to reload his pistols while the other went farther up to survey the area. Yossie watched warily as the horseman above him reloaded. The man, in turn, looked down at Yossie and Thomas with a curious expression.

"You," the man said, after both of his pistols were safely back in his saddle holsters. "You Jew, what you doing here?"

"I am with Thomas, sir. We are taking his daughter to be buried."

"And how comes a Jew to have a Grantville pistol?" the man spoke with a familiar foreign accent.

"We are from Grantville," Yossie said. He was a bit surprised to be recognized as a Jew, but only because none of the local Germans had done so for a month. His clothing certainly told the story to anyone who could read the signs.

"Prove it," the man said. "Prove you're not a lying Jew."

"Sir, what can I tell you?" Yossie asked. The man's insulting language was no real surprise. The question, though, was legitimate, and along with the accent and bad grammar, it hinted at good news "I am Joseph Hanauer," he answered. "I live in Deborah now. I work with Thomas at the forge of the Murphy's Run Mine. I am a member of the *UMWA*. That is the *United Mine Workers of America*."

The man stared hard at Yossie for several long seconds. "I believe you," he finally said, looking relieved. "Sir," Yossie began, after carefully making the little pistol safe in the way Herr Adducci had taught. "Am I right that you are with Captain Mackay's regiment?"

The cavalymen were indeed from that regiment. The freight wagon had been commandeered by an Imperial foraging party, half of which had fled after Yossie accidentally shot their right front horse. The Scots were fairly certain that they'd injured one of the men who'd fled. Aside from that and the dead horse, the skirmish had been remarkably bloodless.

In short order, they set their five captives to cutting the dead horse from its harness and then unhitching the rest of the team from the wagon. The road was narrow enough that the only way to turn the wagon was by manpower with the team unhitched.

Yossie and Thomas left the Scots and their prisoners behind at the town of Teichel. With only a three-horse team, the heavy wagon could only limp along, and the prisoners were on foot. The Scots insisted that Yossie and Thomas take the captured weapons with them, lest the prisoners revolt and rearm themselves. Before they left, they told the townsmen about the dead horse. The town had been stripped, and the horse meat was likely to be enough to save lives.

"Why did he call you a Jew?" Thomas asked, some time after they'd left Teichel.

"Because I am a Jew." Yossie still had difficulty thinking about the battle. It had not been a big battle, nonetheless, men had tried to kill each other, and Yossie had been among them.

Thomas looked at him for a long moment. "A Jew." He paused. "Why did you pretend to be a . . . a Christian?"

"I never did that. I admit that I never said what I was."

"Do the Americans know?" Thomas asked.

"You know they avoid asking about religion," Yossie said. "Remember the Miners Guild rules?" Yossie tried to remember the words Ron Koch had used on Monday when he told them they'd be working together with Catholics who'd surrendered at the battle of Badenburg. Ron had even mentioned Jews as an example, saying that they were as welcome as anyone else.

"You never told me," Thomas said. "I knew it was something different. You don't look German, but I've seen Frenchmen who had your looks. I thought you might be a French Calvinist or something, but I never—" He shook his head. "How can you not be Christian? You seem like a good person, not one of the Pharisees who killed our Lord."

Yossie sighed. "Thomas, this is not the place. We should not dishonor the spirit of your daughter by arguing over her body. We should be saying—" He broke off, fairly certain that *tehilim*, the word he had been about to say, was not German. "We should be saying songs from the Bible. We do not want to tempt the evil spirits. It is bad enough that we fought a battle while she was not yet buried and that we now carry a load of weapons with her body."

***20th of Tamuz, 5391 ( July 20, 1631 )***

"Stop, stop. You're wasting the milk! Let me finish her."

Johnny Adducci backed away from the cow, allowing Gitele to take over.

"Johnny," Basiya called. "Help me with the goats."

Yossie grinned. The eight-year-old's father was Randolph Adducci's son. Johnny lived two blocks from his grandparents, and in the past two weeks, he'd made it his business to help Gitele and Basiya with the

morning milking.

The pasture now held four cows with their calves. Yitzach and Moische had completed their second trip west to the Neustadt cattle market two days before, bringing back two more cows with calves. So far, only one of the four cows needed milking. The other calves were not yet weaned.



Yossie watched Gitele and wondered how he would ever find a match for himself. He could fantasize about Gitele, but he was an orphan with no particular stature, while she was the daughter of an educated merchant, a butcher, qualified to perform kosher slaughter and therefore almost a rabbi. Yossie turned away when he realized that he was staring, and found his sister watching him.

"What are you grinning at?" he asked.

"My brother," Basiya said. "After living in Grantville for over a month . . ."

"After living here a month what?"

"You go to the mine, and work with a woman there who dresses and works like a man. You go into town, and you see women wearing clothing that would make a prostitute blush. All that, and still you look."

"He looks at what?" Gitele asked, still milking the cow.

"He looks at you," Basiya answered, giving her brother a challenging look.

"What?" Gitele pulled the milk pail out from under the cow. "I think it is time to put you to work, Yossie. Here, pour out Johnny's share and then carry this back to the house."

"Are we paying Johnny now?" Yossie asked, as they walked Johnny to his house.

"He is helping," Basiya said. "Besides, there are younger children in that family, and the milk will be good for them.

"He is learning quickly," Gitele said. "Soon, his help will really matter, when the other cows wean their calves."

"I thought you were saying that he is learning quickly, and soon we will have to watch what we say around him," Yossie said.

"That too," Gitele said with a chuckle.

"How many cattle can the pasture feed?" Yossie asked.

"In the summer? By the time the calves are grown, we'll have enough. The next trip my father makes, I guess he will sell all the cattle he brings. Come winter, I think my father will sell or slaughter half of them."

"Good," Yossie said. "I don't think I could handle more cattle."

"Yossele, you couldn't handle just one cow. Stick to being a smith at the mine."

"What? You don't want my help?"

Gitele chuckled, but said nothing during the rest of the walk home.

On any other day of the week, Yossie would have said his morning prayers before breakfast, but this was Sunday. The Adduccis always went to church on Sunday mornings, and then they went to Sunday dinner with one of their many relatives. For most of the day, that meant that Yossie and his companions could be Jewish without fear of discovery.

The men celebrated their day of freedom by saying their morning prayers in the large room the Adduccis called the *family room*. Had they encountered the men at prayer, the Adduccis would have been very puzzled or even alarmed. The men wore their large prayer shawls up over their heads, but the shawls didn't hide the black cubes of the *tefillin* strapped to their foreheads. The black leather straps of their arm *tefillin* were also visible, wrapped around and around their right arms from biceps to fingers.

"Why are we hurrying?" Yitzach said as he was about to start Psalm 30. "Let's take the time to study a bit of Torah."

In a minute, Yakov had his large *Chumash* out on the bar in the family room, along with several books of commentary. "We have a double *parsha* to study this week, *Matos-Masei*," the rabbi said, turning pages looking for the end of the book of Numbers. "Ah, here."

The Hebrew text at the top of the page was familiar, Yossie had studied the weekly Torah portions since he was a boy. "The laws of vows," he grumbled.

"And the war against the *Midianites*," Yitzach said. "It gets more exciting. By the end of *Masei*, we'll be studying the laws of criminal evidence and a woman's right to inherit. You have a good voice, and you could chant well, Yosef, with enough practice. We'll help."

Yossie set to work chanting the text from the last two portions of the book of Numbers, concentrating on the complex melody. He couldn't have done it very well from a hand-written Torah scroll, but the printed text in the *Chumash* was punctuated with marks that indicated the vowels and melody. Even with the punctuation, Yossie needed help now and then.

Occasionally, Yakov stopped the chant to note an interesting interpretation from one or another commentary. Sometimes, he would refer to one of the marginal notes that filled more than half of each page in the *Chumash*, while at other times, he referred to one of his books of commentary.

"Abravanel has a good comment on this section," Yakov said, when Yossie reached the start of *Parshas Masai*. The final section of the Book of *Numbers* begins with a list of all the camps of the Israelites during their forty years in the wilderness.

"Abravanel said that on Israel's road to the redemption, the Lord, praise his name, will take us back to all of the places listed here. I don't know if he means that literally."

"If it's figurative, is the road from Hanau part of the road to the final redemption?" Yossie asked.

"Perhaps," Yakov said. "May the Messiah come soon and in our time."

Some time later, while they were putting things away after their prayers, Yossie paused. "*Rav* Yakov,

that commentary you have, Is the author related to the woman the Americans call *Becky*?"

"Probably," Yakov said. "Abravanel, Abrabanel, Abarbanel, the name changes from place to place, but it is one family. Rivka Abrabanel has the *chutzpah* that you'd expect from a member of that family. Did you know that the Abravanel who wrote that Torah commentary was the banker to the king of Portugal? Even so, these stories of Rivka's betrothal . . ." He fell silent.

"To Michael Stearns, the head of the Emergency Committee?" Yossie asked.

"Yes," Yakov said. "But to speak of it would be *lashon ha-ra*. Even if it is true, it is speaking with an evil tongue to repeat such stories needlessly. Let's get back to work."

They had only eaten lightly before their morning prayers, so when they finally finished, their midday meal was as much a breakfast as it was a lunch. They were just finishing the long grace after meals when there was an unexpected ring of the doorbell.

Moische went to see who it was, and came back into the family room leading Bernadette Adducci and one of the Scots cavalrymen.

"Moses, Isaac Kissinger, Joseph Hanauer," she began, trying to speak in German. "This is John Leslie. Please, sit on the table. John, help."

"At the table, please," he said, correcting her. Once they were all seated, John went on, in the broken but clear German Yossie had come to associate with the Scots. "Bernadette Adducci is officer in the Grantville Police. That be what the Americans call the town guard. She tells me you three, you all traveled outside the *Ring of Fire*. We must know what is out there. Can you help?"

When they'd first come to Grantville from the west, Claudette Green had asked very similar questions in the Red Cross office. Now, the questions were about the recent trip Yitzach and Moische had taken west to the cattle market in Neustadt, and Yossie's trip north the week before.

For the next half hour, Bernadette took careful notes while the three of them described their trips.

Bernadette's questions focused on three things. She wanted to know the names of villages, the quality of the roads and paths they had followed, and most of all, she wanted to know about troop movements.

The discussion of the road west from Badenbergl to the Werra valley got into such detail that Moische excused himself to get his little book of notes. "It sounds like you're trying to make a map," Moische said, as he came back.

"Aye," John said, and then spoke quickly with Bernadette. "The Americans," he said, after she answered, "they have maps that show all the world. The problem is, the maps show roads from the year 2000, not today. They need to put the roads of today on their maps."

"Can we see these maps?" Moische asked.

John and Bernadette conferred briefly, and then Bernadette answered. "Yes, at *City Hall*."

After Yossie had finished describing his trip north, John spoke for Bernadette. "Our official work is done. Bernadette wants to know, Isaac and Moses, are you going on another trip?"

"Yes," Moische said. "The market is good. Tip's Tavern will buy all the wine we can get."

"Herr Mobley has a list of idle pastures around Grantville," Yitzach said. "If we can bring cattle, he will find buyers for them."

John conferred briefly with Bernadette and then turned to Yossie. "Joseph, how is work at the mine?"

"Good," Yossie said, wondering how to explain what he was doing. "We are building an *electric coal saw*. It uses a *washing machine motor*."

The saw had been suggested by the chief miner, Ken Hobbs, and Gayle Mason, the mine electrician, had done all the electrical work. Most of the machine, though, was made of iron, and most of that had been cut and shaped in the Murphy's run forge.

"What is a *coal saw*?" John asked.

"It is a big saw for cutting under the coal in the mine," Yossie said. "It cuts a yard deep, so that the coal above can be broken down."

"Does it work?" John asked, after translating for Bernadette.

"Almost," Yossie said. "We tried it Friday, but we need to make changes."

Bernadette and John conferred before John asked a very odd question. "Do you like your job, working at the mine?"

Yossie was not sure how to answer. "Why?" he finally asked.

"Because there is another job. The Americans say it may be more important. They want a print shop. You were a printer?"

Yossie nodded. The Americans never seemed to grasp the fine distinctions between being a printer and merely working in a print shop.

"If you want to be a printer again, you should talk to Herr Kindred."

Bernadette handed Yossie a slip of paper with the name "Kindred" printed on it in block letters and a number. "Telephone," she said. "Paulette will help. John, we must go. Joseph, Isaac, Moses, good bye."

As John got up, he smiled. "She promised me, we eat dinner at her brother's house."

### ***8th of Av, 5391 ( August 6, 1631 )***

Wednesday morning, as Yossie rode the bus up Murphy's Run, his eyes were on the new railroad tracks parallel to the road. The salvaged rails came to an end about a mile from the mine, but Yossie could see progress almost every day. He still found it amazing that the Ring of Fire contained enough iron rail to build the new railroad.

When Yossie arrived at the forge, the hearth was cold. Thomas and Karl were already there, but nobody had started the fire. "We'll be going away somewhere," Karl said, in answer to Yossie's question. "That American, Herr Koch, said so. Some kind of emergency."



Yossie was curious, but also worried by the news. Tomorrow was the ninth of Av. From sunset to dusk, over twenty-four hours, every Jew was expected to abstain from all food and drink in memory of the anniversary of the destruction of the Temple in Jerusalem. Yossie didn't want to risk missing the last meal before the fast.

Soon after Fritz arrived, a large pickup truck pulled to a stop by the forge. Ron Koch and Gayle Mason got out, along with two other Americans, Jimmy and Orval. After a brief flurry of activity collecting tools from the mine shop and forge, they all loaded into the truck. Yossie and Fritz ended up sitting on tool chests in back, next to the large round tank that held the truck's fuel, something the Americans called *natural gas*.

The truck took them into Grantville and then south on a gravel road up a small valley and over a ridge. As they came to the top, the view ahead was dominated by the dark face of the cliffs that marked the border of the Ring of Fire.

The height of the cliffs varied immensely. The peaks and valleys of the Thüringerwald outside the Ring of Fire didn't line up with the ridges of the Allegheny Plateau inside. On the south side of the Ring, the hills outside were far higher, and one of them completely blocked the valley ahead of them.

Downhill toward the cliff, Yossie saw water. With no exit, whatever stream flowed in the valley now fed a growing pond against the foot of the cliff.

The road came down almost to water level and then paralleled the shore of the new pond. As they approached the cliff face, Yossie noticed several huge boulders that had fallen nearby. One was at least the size of a house.

It was only after the truck stopped that he saw their destination. The structure that stood close in the shadow of the cliff was a miniature version of the hoists that stood over the two entrances to the Murphy's Run Mine. Where the cage of the main hoist at Murphy's Run might have held the truck he'd been riding, this one was hardly large enough for two men.

Ron Koch gathered them around. "Amalgamated Number Eighteen was a mine south of Grantville. The main entrance was outside the Ring of Fire, but part of it is under this valley. This shaft was used for air, to pump out water and for emergency escape.

"Now, this is our only entrance to Number Eighteen. After the Ring of Fire, there was no electricity for the pumps. When we discovered that this entrance was inside the Ring of Fire, the shaft was already flooded. Yesterday, we fixed the electricity.

"The lake is rising, and it will flood this area by winter. We want to take everything we can get before that happens. Our job today, if we can do it, is to start pulling out one water pump. The other pump will keep us dry while we work."

"Did they drown down there when it flooded?" Karl asked.

"No," Ron said. "The part of that mine under us here was all mined out and the Ring of Fire was on a Sunday. There shouldn't be any bodies down there, and ghosts are unlikely. This shaft is here because it's a low spot in the mine, the water runs here so the pumps are here."

There were two pumps. At first, Yossie thought the pumps were the man sized machines standing at the base of the hoist. As they set to work, he learned that they were just the electric motors that worked the pumps. They were nothing but large versions of the washing machine motor Yossie had already worked with. Each sat atop a vertical pipe larger than his thigh that ran down the shaft.

Gayle and Jimmy removed the wires connected to one motor. While they did that, the others rigged a chain hoist to the tower over the mine shaft and took the sides off of the hoist cage. By noon, they'd undone the bolts holding the motor to its foundation and loaded the motor and its cast-iron mount in the back of the pick-up truck.

Yossie and the others ate their noon meal while they waited for the truck to return. The four men from the forge sat together on a grassy bank looking out at the lake that was slowly rising in the valley.

"What I don't understand is, how do the motors pull the pump rod up and down," Thomas said, after washing down a mouthful.

"It's not push-pull rod," Fritz said. "It goes round and round."

"How d'ye know that?" Karl asked, between bites.

"The motor goes round like the washing machine motor, only bigger."

"Then why is the shaft right down the middle of the pump pipe?" Thomas asked.

Yossie listened with interest to their speculation. Fritz had arrived at the forge with the reputation of being able to fix anything, and Yossie could see how he'd earned it. He seemed to grasp how things worked more quickly than most people, and when he guessed, he was usually right.

By the time Yossie walked away to say the grace after meals, the conversation had turned to the stability of the cliffs that loomed above them. The fact that some huge blocks of stone had fallen was clear proof that other blocks could follow.

When Yossie returned, he found Thomas, Karl and Fritz looking his way. "What were y'doin up in th'woods?" Karl asked. "Ya always go way after we eat. At the forge, an now here."

Yossie hesitated for a moment, and then decided that he had little to lose by telling the truth. "I was *bentsching*, praying."

"You're a Jew, not a priest," Karl said. "Whatcha praying for?"

All three of them knew he was a Jew. He'd found that out shortly after his trip north with Thomas. Karl and Fritz had guessed the truth shortly after they came to the forge, but had said nothing until Thomas mentioned it.

When he finally answered, he spoke very carefully. "Jews pray a short prayer before each meal and a

long prayer after."

"Then how come ya go away for the one and not the other?"

"The short prayer I can just say. The long one, I have to read from a book."

"I don't see no book," Karl said.

Yossie hesitantly pulled his *bentscher* from his pocket. The slim little volume was worn from years of daily use. Yakov had given him the book as a bar mitzvah gift when he turned thirteen.

Karl took the book and opened it, upside down, and squinted at it. "I can't read this," he said handing it to Fritz.

"You don't know how to read," Fritz said, taking the book. "These are Jewish letters."

Thomas was looking over his shoulder. "They're not any letters I've seen." He looked up at Yossie with a puzzled expression.

"Like Fritz said, it's written in Jewish letters," Yossie said. "Can I have my book back?"

"Give Joseph his book," Ron Koch said, taking all of them by surprise. "Joseph, are you Jewish?"

"Yes," he said.

"Are they giving you trouble because of it?"

"Not really," he said.

"Good," Ron said. "Let's get to work then. We just turned on the other pump. We'll follow the water down, taking out sections of pipe while the falling water pulls fresh air into the hole."

The hoist cage was tiny, hardly large enough for two men. Yossie and his companions eyed it suspiciously.

"You're little. We'll go down first," Ron said. It took Yossie a moment to realize that Ron was speaking to him.

After they got into the hoist, Ron rapped twice on the frame with a wrench. Immediately, the cage began to drop into the shaft. Almost at once, Ron rapped again, and they stopped.

Two black iron pipes ran down the side of the shaft. The pipe below the motor that was still working hummed quietly, the other was silent. The hoist held them level with a joint in the pipes, and after they'd unbolted the joint, they chained the pipe to the side of the hoist.

"You signal to go up," Ron said. "Rap on the hoist frame up high where the cable is attached. One rap means stop. Two raps mean down, three mean up. Use your wrench."

They lifted the pipe section the short distance to the surface, and as soon as the crew on the surface had the pipe chained to their small hoist, Yossie and Ron went down to get another pipe segment.

While they worked, Yossie considered Ron's reaction to the discovery that he was Jewish. It appeared that the only thing that concerned him was that it might be disruptive.

When Bernadette Adducci had told her parents that their tenants were Jewish, their reaction had been more complex. Part of the problem was undoubtedly one of communication, but there was also no doubt that Paulette and her husband Randolph were of different opinions.

Randolph had grumbled, and several times, Yossie had heard him arguing with his wife about "damned Jews." He'd returned to the unpleasant attitude that he'd shown during the first week of their stay with the Adduccis, only then, the complaint had been "damned foreigners." Sometimes, though, it was obvious that Randolph's real complaint was about the chronic pain in his feet, not the people around him.

Paulette had said little, but over the next few days, she'd quietly come into each of their bedrooms and taken down the crucifixes. At times, it seemed that she was trying to ask more questions, but they had too little language in common to discuss anything subtle.

After Ron and Yossie had removed the first few pipe segments, the routine settled in. The later pipe segments were longer and heavier than the first one, but the work was the same. The drive shaft running down the center of the pipes was segmented like the pipe itself, and they had to be careful, with each pipe segment, to make sure that they lifted the drive shaft segment with the pipe that enclosed it.

While they worked, Ron asked Yossie about his work. Ron had been highly critical of the coal saw project at first, but after two complete rebuilds, the saw worked well. Yossie had gone down into the mine several times to work the saw, and he had some ideas for improving it.

When they were well down the shaft, Ron surprised Yossie with a question. "You are a Jew. The others are Christians. Is this going to make trouble?"

"I don't think so," Yossie said. He paused to loosen a bolt. Ron's concern was unexpected, and he wasn't sure how to answer. "They know I'm a Jew. They've known for three weeks."

"How have they reacted?" Ron asked.

Yossie wasn't sure what Ron wanted. "Saxons like Thomas have never met a Jew before. The Bavarians, well, they've seen Jews, but they know very little. They get curious sometimes."

"So they are not a threat to you?" Ron asked, while the two of them wrapped a safety chain around the pipe segment.

Yossie finished attaching the chain before he answered. On the one hand, Christians were always a potential threat, but he certainly couldn't say that to a Christian. On the other hand, the Americans seemed serious about their rules forbidding religious discrimination.

"They are members of the miners guild now," Yossie said. "As long as the UMWA rules hold, there is no threat."

### ***14th of Elul, 5391 ( September 11, 1631 )***

Yossie thought about what he had seen on the Adduccis' television the night before. The show had begun with Rivkah Abrabanel, who the Americans called Becky. She had told them news, both news of Grantville and of the larger world, and then she'd introduced a movie, *The General*.

The movie had been good, but the real novelty was seeing Rivkah up close. She was the second most powerful person in Grantville, speaking from the television as if she was in the same room. Yossie wondered what the television would show next.

"Hey Joe," Woolly Snider called, interrupting Yossie's thoughts. "That room'll be done next week. You sure your friend is coming?"

"The Lord willing, Shlomo comes in one week," Yossie replied. Moische had gotten a letter before he left on his most recent trip west saying that his cousin would meet him in Neustadt.

"What kinda name's Shlomo?" Woolly asked.

"He was king after David in the Bible," Yossie answered, walking on.

"Solomon?" Woolly asked, and then muttered. "Damned Krauts can't say names right,"

Yossie had heard the phrase "damned Krauts" often enough. He knew what it meant. He also knew that Woolly was a harmless drunk, and that despite his drinking, he'd done quite a bit for Grantville's new residents.

The Adduccis had been among the first Americans to take in boarders after the Ring of Fire, and many others had done so since, but few with the enthusiasm of Wooly Snyder. Where others had rented out idle rooms, Wooly, with the help of his tenants, had built new rooms. True, they were not luxurious, but they were a step up from the barns and tents where some of Grantville's new residents lived.

Yakov was waiting for him at the house. "Join me for the afternoon prayer," he said, handing Yossie a prayerbook. "When we finish I want to talk."

Yossie and Yakov stood together on the porch facing east, swaying with the rhythm of the liturgy. It was still a novelty for Yossie to be able to pray openly where Christians might see.

"So," Yakov said, as he closed his *siddur*. "How is your type cutting?"

Yossie pulled the small roll of cloth from his lunch pail. It held the punches he'd taken to the forge to harden and temper. "Miniscule *b* and *d*," Yossie said. "They are also *p* and *q*."

Yakov took the two punches and eyed them closely. "Not bad," he said. "At this rate, you should finish the miniscules by winter."

Yossie nodded. Some letters in the *Helvetica* type style Herr kindred wanted were trivial. The *l* was the simplest. Others like *o* required a simple counterpunch. And then, there were letters like *s*. Yossie expected to spend a week or more of his spare time moments getting that letter right.

"But this is not what I want to talk about," Yakov said, returning the punches. "What should we do for the High Holy Days?"

"Do we have a choice?" Yossie asked. Rosh Hashanah was just half a month away, and Yom Kippur ten days after that. "I thought we were going to Badenburg."

"Yes," Yakov said. "I thought so too, but now, it seems that we have a choice. There may be a *minyan* in Grantville."

Yossie did some quick arithmetic. The four men living with the Adduccis plus Shlomo, plus Doctor Abrabanel, plus the jeweler Morris Roth . . . "I get seven men," Yossie said. "Where do we get three more?"

"I told you about that woman Eve Zibarth who teaches at the school," Yakov said.

Yossie nodded. Yakov had described her as being very American, but able to speak Hebrew with a strange Sephardic dialect.

"It turns out she really is Jewish. *Eve* is the American way to say the name Chava. Anyway, today, she introduced me to a man named Jason Gotkin, who it turns out is also a Jew."

"Jason?" Yossie asked.

"Yes, an odd name for a Jew. He said his Hebrew name was Yehoshua."

Yossie wondered what he could infer from the fact that the two American Jews went by the odd names Morris and Jason. Were they crypto-Jews, hiding their Jewish identity? Randolph Adducci's occasional grumbles about "damned Jews" suggested that Americans were not always as tolerant as they liked to think.

"Jason said that if Grantville can raise a *minyan*, Uriel Abrabanel will come from Badenburg. He also said that there are two young Abrabanel's who are supposed to come from Holland any day now, and one from Turkey."

"Then we could have twelve!" Yossie said.

"The Lord willing," Yakov said. "And there may be more. The Abrabanel family is wealthy. Most

people from such families travel with servants. On the other hand, the roads are hazardous." He paused. "I learned something very strange about the Americans from Jason."

"Yes?"

"The Americans have the tradition of counting women toward a *minyan*."

Six months ago, Yossie would have been shocked. Since then, had been around Americans enough that he just nodded. "So they would consider that we already have a *minyan*? I wonder how they justify that?"

"I wonder too," Yakov said. "Jason did say that he understands that we would not recognize such a *minyan*."

Basiya interrupted. "Are you men going to come in for supper?"

\* \* \*

They spoke English at the table out of deference to their hosts. As usual, Paulette Adducci led the conversation, asking each of them in turn to tell what they had done that day. The conversation was frequently more of an English lesson than anything else.

"I have a trouble," Chava said.

"A problem," Paulette corrected.

"Yes, a problem. I can sell more bread, but the oven. It is too small. I can not more bread make."

"Make more bread," Paulette said. Chava had taken some time to master the Adducci's gas oven, but in the last month, her occasional baking for the neighbors had expanded into a small business.

"Tip's wants more bread," Chava said. "Where can I get more oven?"

Randolph Adducci grumbled. "You could ask my son Nick to use his. It's only a three block walk."

Chava didn't like that idea, or the idea of asking nearby neighbors. Yossie suspected that the root of the problem was that none of the neighbors kitchens were kosher. Explaining that to the Adduccis would have been impossible, since they didn't even know that their own kitchen was kosher. All they knew was that Chava, Gitele and Basiya had effectively taken it over.

"Jacob," Paulette said. "How is the elementary school?"

"It is good," Yakov said, and then told of the problems he was having. "The big problem we have," Yakov said, "is books. We need more *kinder* books, children's books. We need to print new ones. Yosef, we need big letters in that Swiss typeface."

"*Helvetica*," Yossie said. "That is what Herr Kindred calls it. I try to finish *zwolf* point first. Then, if Herr Kindred says yes, we make bigger."

"Joseph, how is the mine?" Paulette asked.

"We have trouble with the *auger*," Yossie began, and then ran out of words. Randolph was very interested in the new small mining machines they were building. The language of the forge was German. Yossie simply didn't have the vocabulary to describe the problems they were having forging the one-foot diameter helical cutting blade for the coal auger.

"Randolph, how was the pharmacy?" Paulette asked.

"We're running out of things. People are making soap, but no shampoo. My boss Tino is trying to make stuff, but it's crazy, he's buying dope now, from that hippie Tom Stoner. I swear, if someone came in with eye of newt, he'd buy the damned stuff.

"Hey," he said, breaking off. "You guys would be interested. Doctor Abrabanel, he comes in to talk herbs and recipes with Tino, and today, he said something. He said he was looking for a building to use

as a synagogue."

*26th of Elul, 5391 ( September 23, 1631 )*

"That is it," Thomas said, giving the frame of the tub a shove with his foot. The frame rolled a short distance along the wooden rails that now led from the forge.

Yossie liked the variety of the work at the Murphy's Run forge. One day, they'd experimented with ways to make roof bolts for the mine. Another day they'd fixed the snowplow blade after it was damaged grading the dam of the new coal waste pond.

They'd spent most of Tuesday making the metalwork for a new tub, the four wheeled coal carts that ran on the little railroad they were building inside the mine. The tub's riveted iron frame was made from metal from the conveyor they'd disassembled. The wheels and axles were from old mining equipment a Grantville machine shop had salvaged. Once the carpenters added floor planks and side boards, the tub would hold two tons of coal.

"Joe," Fritz said. "I want to try something before we go home. You tempered some type punches at lunch time, right?"

"Yes," Yossie said. "Why?"

"I want to try something," Fritz said, tossing a small scrap of iron into the hottest part of the hearth. "I think I know how to copy your little punches."

Yossie warily took the roll of cloth from his lunch pail that held the miniscule *m* and *e* punches he'd just finished. Fritz had been curious about his type cutting for several weeks. He'd been particularly fascinated by the idea of using counter punches to form the inside curves on the face of a punch. The *m* and *e* had required counter-counter punches. "These took work to make, Yossie said. "What do you want to do?"

"To make the matrix for a casting a chunk of lead type, you'd punch one of these into a piece of copper, right? What I want to do is punch it into a hot bit of iron. It'll only touch it for a moment."

Yossie decided that the risk was small, and as a result, when he got onto the bus home, he had a fresh copy of the *m* punch in his hand. It was visibly smaller than the original, because the hot die had shrunk after the *m* had been stamped into it. In turn the new punch had been red hot when it had been hammered into the cold die.

Yossie almost missed his bus stop as he thought about the new copying method. It wasn't his usual stop. Monday, Yakov had come home from the elementary school with news. Eve Zibarth had told him that they were all welcome to meet at the new synagogue building downtown on Tuesday afternoon to help prepare it for the High Holy Days.

"Go across Buffalo Creek from the bus stop downtown, then left. The building has the letters *IOOF* on the front. Bring a picnic dinner." The instructions were clear enough.

The building was larger than he expected. It stood two stories tall at the east edge of the business district, almost a perfect cube of gray stucco. Grantville's middle school was just a block south, and there was a church down the street to the east. The mysterious word *IOOF* was cut into the stone lintel over the door, and repeated even larger in the central capstone of the parapet.

"Ah! Just in time," a strange American woman said, as he stepped inside. "Come! We need help moving the stove."

She led Yossie back into a busy kitchen. Chava and Basiya were there, scrubbing the shelves of the

cabinets while Gitele and an older American woman worked at the sink.

"Who are you?" the older woman asked as Yossie put down his lunch pail and hard hat.

"My brother Yosef," Basiya said. "This is Judith, Frau Roth."

Yossie nodded, very conscious of Gitele's presence.

"Sorry, I'm Samantha," said the woman who'd led him in. "We need to move this stove, to clean behind it."

Yossie hardly recognized it as a stove. All the removable parts were piled around the sink, and it was much larger than the one in the Adducci's kitchen. The floor and wall they exposed when they moved the thing were covered with a thick layer of dust and filth.

Judith groaned. "This kitchen hasn't been used for twenty years, and I swear they didn't clean it for twenty years before that."

"Who are they that didn't clean?" Yossie asked. "And what is, how do you say it, *ioof*?"

"I. O. O. F." Samantha corrected, with a smile. "Your sister asked the same thing. The Independent Order of Odd Fellows used to own this building."

Yossie decided not to ask what an *odd fellow* was. "Where are the men? I should go *daven Mincha*."

"Upstairs," Gitele said.

"When you're done praying, come help put the stove back," Samantha said.

A large hall filled most of the second floor, with high windows and a raised stage along the south wall. The sound of a vacuum cleaner filled the room. An American woman was up on a ladder cleaning the windows, Yitzach was working the vacuum, Yakov and two younger men were huddled over something on the stage, and more men were at work in the two closets that flanked the stage.

"Yosef!" called Yakov, looking up. "Meet Jason Gotkin and Dunash Abrabanel. Dunash just arrived from Holland last week. We have been discussing the question of *minhag*."

"The sun is low," Yossie said.

"Ah," Yakov said, and then called. "*Mincha!*"

Moische and his cousin came out of one closet, and a dusty stranger emerged feet first from under the stage. "There are things like this under there," the stranger said, dragging out something big.

Yakov introduced Yossie to Rafael Abrabanel and then pointed to his box of Hanau *Siddurs*. As Yossie picked up a prayerbook, he noticed that Jason and the Abrabanel each had their own.

Through the afternoon service, Yossie's mind wandered occasionally from the prayers at hand to what he could see of Jason's *Siddur*. It was thick, and he could see that it included not only beautifully set Hebrew type but an equal quantity of English text. He was curious about what it might say, but he was also curious about it as a book.

"So," Yakov said, after they'd all finished the service. "Yosef, you have not heard our discussion. Instruct us in the laws of *minhag ha-macom*."

"We are supposed to keep the customs of the place where we are," Yossie said.

"But what is the *minhag* for chanting the Rosh Hashanah service in Grantville? Do we use the Ashkenazic melody, the Sephardic, or the American? Jason says there has never, ever been a *minyán* in this town." Yakov paused. "Tractate Pesachim," he hinted.

"Travelers should keep the restrictions of the old place," Yossie said, remembering. "And also of the new place." He grinned. "And it says we should not argue about it."

"Right," Yakov said. "It seems we are all travelers, some who must keep the *minhag Ashkenaz*, some the *minhag Sepharad*, and some the *minhag America*."

"What *Machzor* will we use?" Yossie asked. He and Yakov had a few High Holy Day prayerbooks left from the stock of books they'd brought from Hanau.

"So far as I know, there is only one uptime *Machzor* in town," Jason said, answering Yossie's German in English. "An old *Silverman* I picked up. The Roths have some tapes too, but the real problem is, there is no *Minhag America*."

"Why not?" Dunash asked.

"American Jews were divided, *Reform* versus *Conservative* versus *Orthodox*, and even within the movements, there was controversy."

Dunash nodded. "We brought three *machzors* from Amsterdam. I think what we need to do is divide the service."

"We should compare all the prayer-books, mark the pages that have the same prayers and find the differences," Jason said.

"Joseph," Samantha interrupted, from the top of the stairs. "We need to move the stove back."

By the time Yossie and Samantha had the heavy stove in place, Rafael had figured out what it was that he'd dragged out from under the stage. It was a folding table. There were also folding chairs, and as Yossie came upstairs, Basiya, Gitele and Chava were unpacking their picnic dinner on the table.

Yossie ended up seated with his sister across from Rafael Abrabanel and Moische's cousin Shlomo.

"Who are you again?" Rafael asked, in English.

"Yosef Hanauer," he said.

"Not American?"

"I'm from Hanau," Yossie said, taken aback. His shirt and jeans were indeed American, from the Value Mart, but he had never expected to be mistaken for an American.

Rafael shifted to strongly accented German. "How long have you been here?"

"Since *Shavuos*," Yossie said, unwrapping his sandwich. "Over three months."

"Almost as long as my uncle Balthazar. So you've become a real expert on these Americans?"

Yossie shook his head. "No. I think that would take a lifetime. I can tell some stories, but I am no expert."

"What's that you're eating," Rafael asked, looking curiously at Yossie's sandwich.

Yossie spent a minute explaining the American custom of packing an entire meal between two slices of bread.

"You see?" Shlomo said. "He's more an expert than he'll admit. He's a guildsman too."

"Who are you again?" Rafael asked.

"Kalman Gomprecht," Shlomo said, using his German name. "From Frankfurt."

"Merchant?"

"I suppose," Shlomo said. "My cousin Moische sent me a good list of things to buy and sell on the road here. Thanks to that list, I'm better off now than I was in the Rothschild house. You came from Amsterdam?"

"Yes," Rafael said, turning to Yossie. "A guildsman?"

"I work at the coal mine as a smith," he said. "The American idea of a union is not exactly a guild. The UMWA is . . ."

"You are a member of the UMWA? Michael Stearns is guildmaster?"

"He is *president*," Yossie corrected.

"But he leads the UMWA. I heard that the UMWA has a powerful militia. Are Jews part of that?"

"Yes," Yossie said. "The Americans want every strong man to be ready to fight. They don't care if you are a Jew."

"That battle last week, outside of Leipzig," he said. "I hear that the Imperials were badly defeated. That is not far away. If the Swedes or the Imperials come here next, will you be able to hold them off?"

"The UMWA held off an imperial *tercio* at Badenberg, but I wasn't there."

"Have you been in any battles?"

"Not really."

"Yosef," Basiya said. "Don't be modest. Tell him about your trip north."

Yossie spent the rest of the meal telling the story of his trip to Magdala with Thomas. It was not a story he minded telling, particularly within earshot of Gitele.

As he and the others from Deborah walked home that evening, they discussed their encounters with Grantville's American and Sephardic Jews. Rabbi Yakov, of course, was fascinated by the puzzle of accommodating their diverse traditions. Yossie, on the other hand, was puzzled by the young Abrabanel he'd met.

The Abrabanel family was as powerful as any Jewish family in the world, yet Rafael had seemed almost shallow. When Yossie asked Yakov about that, Yakov answered with questions.

"How much did he learn about you? How much did you learn about him? Could a truly shallow man learn so much while telling so little?"

***Rosh Hashanah II, 5392 ( September 28, 1631 )***

"*Tekiah gedolah*," Dunash Abrabanel called, early on Sunday afternoon.

His cousin Rafael blew the long final blast on the *shofar* for the Rosh Hashanah morning service, and then Jason Gotkin led them in singing the response. The melody was unfamiliar but this was their third repetition, so many of them joined in singing the ancient Hebrew words.

"Today the world is conceived. Today all creatures stand in judgment, whether as children or as servants. If as children, have mercy on us as a father has mercy on his children. If as servants, our eyes turn to you to judge us with grace, revered and holy One."

The interplay of Sephardic, Ashkenazic and American elements in the service was fascinating but also distracting. The Abrabanel and the Americans spoke Hebrew with an accent Yossie found harsh. At times, it verged on being incomprehensible. Many of Dunash's chants seemed monotonous, while Jason's chanting was the opposite, turning prayers into songs.

Yossie was not surprised by the contrast between the different liturgical styles. He'd spent several hours with Yakov pouring over Jason's and Dunash's *Machzors* the previous Wednesday evening. The differences were plain enough even without melodies.

The real surprises came from other quarters. The first surprise he should have expected after living among Americans all summer. The American women, particularly Samantha and Eve, expected not merely to be counted toward a *minyan* but to actually sit in among the men. Frau Roth was more

flexible, but her husband was unhappy with the idea that they might not end up sitting together.

Jason Gotkin had spent some time describing, as well as he could, the different American positions on the role of women. Yossie was still confused by the distinctions Jason had described between Reform and Conservative Jews, but he and the other men had agreed to something of a compromise.

They had arranged the chairs in their new synagogue in three rows. Two east-west rows for the men faced inward toward the reader's table in the middle. A third row along the west wall was set aside for the women. The stage on the south wall was completely ignored, since the front of the room had to face Jerusalem to the east. The arrangement was not as good as a properly screened women's gallery, but that would have to wait until they had time to remodel the interior of the synagogue. Decency was preserved because everyone would be facing east at the times when a man should not be distracted by a woman's presence.

As the Friday night services began, the entire congregation had been surprised by the arrival of two additional men. Yonatan Bacharach and his companion were refugees. They'd left Halberstadt in the spring, but had only recently arrived in Grantville after spending the summer just outside of Jena. With those two, they had fourteen men in the congregation that evening.

There had been other even more unexpected faces in the room for the first evening of Rosh Hashanah. Four American men had come. They sat in back, in some of the seats that had been set out for the women. One of them was Pastor Green, a Protestant minister Yossie remembered meeting when he'd first come to Grantville.

The pastor recognized Yakov, and before the service, he'd introduced his friend Joseph Jenkins. It turned out that both Americans knew some Hebrew and hoped to follow at least part of the service.

Toward the end of the service, Balthazar Abrabanel had introduced the other two Americans, giving each a chance to speak. One was the mayor of Grantville. He spoke briefly in English to welcome the new congregation, but it was a confusing speech. Yossie had no idea what to make of "enriching Grantville's cultural diversity."

The other man Balthazar had introduced was an American Catholic priest. His welcoming speech was also a puzzle. He spoke in English and broken German, but with occasional Hebrew words. He quoted some papal document named *Nostra Etate*, about "the spiritual patrimony common to both Christians and Jews." Then he quoted a Cardinal named Ratzinger, saying that although there were many religions, there was only one covenant, and that there was only one will of God.

Yossie had attempted to make sense of this, but the primary message was clear without words. An official of the Catholic Church was present and approved of their synagogue. When Yossie and Yakov spoke about this later, Yakov pointed out that the priest's approval was not that unusual. "The synagogue in Fürth was built with Church approval," he'd said, and then he'd added a warning. "That wasn't enough to protect it when Mansfeld's army came to town."

\* \* \*

"In the book of life, blessing, peace and well-being, remember and inscribe before You, us and all your people the house of Israel for a good life and for peace."

As Dunash led the closing prayer for peace, his chanting departed from his usual monotone. It was almost melodic.

The ancient prayer for peace was strongly felt by everyone in the room. A large portion of Grantville's militia had recently left for Jena. Splinters of the recently defeated Catholic army were ravaging the

countryside south of Leipzig, and Jena had asked for help. Yossie had no doubt that the Grantville militia would succeed, but he feared for the safety of those he knew who'd gone north. Several Americans from the mine were among them. To Yossie's astonishment, even Gayle Mason had gone. For the moment, peace seemed assured for the small Jewish community within the Ring of Fire, but only if the miraculous arms of the Americans could keep the war at bay. The prayer was not just for personal well-being. It was not just for the local community. It asked for peace for all God's people, specifically for all the house of Israel. The situation in many German cities was precarious, and wherever the war touched, disaster was sure to follow.

\* \* \*

*"None are like our Lord.*

*"None are like our Ruler.*

*"None are like our King.*

*"None are like our Savior."*

The service continued with Jason leading a song. His tune for the ancient Hebrew poem was almost the familiar Ashkenazic tune, and by the end, even the Sephardic Jews in the room were singing along.

Yossie had concluded that Jason's knowledge of the liturgy was rather shallow. He knew interesting tunes for the common elements of the service and the highlights, but couldn't handle the motifs for the longer chanted passages. Nonetheless, Jason's knowledge outstripped that of Morris Roth.

Yossie would have expected Morris, as the senior American Jew, to lead major parts of the service, but he didn't lead anything, and in fact, he came late and didn't even attend the final section of the Saturday morning service. Sunday morning, when Yossie had chanted the Torah portion, Dunash had called Morris to the Torah using his Hebrew name, *Moische ben Chiam*. Morris hadn't responded until Jason had whispered "Morris, that's you."

Yossie had been surprised to be asked to chant the Torah reading for the second day of Rosh Hashanah. None other than Balthazar Abrabanel had chanted the first day's portion, and Yossie thought that both Yitzach and Yakov were better readers. It was, however, a straightforward reading. The passage about Abraham's near sacrifice of Isaac was one he'd practiced chanting many times while living with Yakov. Yossie's primary difficulty was with the complex melody for the High Holy Day Torah readings. He knew it, in theory, but he'd never chanted it in public before.

\* \* \*

It was Jason's turn to lead them in the final hymn of the service. The tune he used was totally unfamiliar, but the Americans obviously knew it. They all joined in loudly. It wasn't long before Yossie joined in.

*"He is my living Lord and savior, my rock when grief or trials come.*

*"He is my banner and my refuge, my full cup on the day I call."*

\* \* \*

After the service, as the men put away the prayerbooks and took off their large prayer shawls, the

women came up with plates, pots of food, and round loaves of bread. Soon, what had been a prayer hall was a dining room.

Yossie and the others from Deborah had been living in the Odd Fellows Hall since Friday. Deborah was far enough away that walking that distance would be improper on the Sabbath. For the evening meals, most of the Grantville residents had gone home to dinner, but many had stayed for the afternoon meal on Saturday, and more stayed on Sunday. Uriel Abrabanel, in particular, stayed. He and Moische fell into deep conversation about Grantville's mapmaking efforts and the notes Moische and his father had accumulated about the roads from Frankfurt to Magdeburg.

After the meal, Yakov invited Yossie for a walk around the center of Grantville. "It's not good for a man to be alone," he said, quoting the Torah. He paused as they walked up the hill toward the middle school. "Have you thought about marriage?"

Yossie nodded. "Who am I fit to marry? I'm an orphan of no stature."

"Don't underestimate your stature," Yakov said. "Since I took you into my house after your parents died, I've known that it would be my job to find a match for you and your sister. Both of you have been of marriageable age for several years. Your stature as orphans in the care of a poor teacher has been low, but no longer. You are, if not a guildsman, a respected UMWA member, and all of our investments in Yitzach's mercantile ventures have paid well."

"So why are we talking about this now? It is still Rosh Hashanah, no proper time for doing business."

"Because someone else has asked about you, and there is no business to conduct, at least not yet." Yakov said. "Tell me. Is there anyone you have admired. Someone you would want to be interested in you."



Yossie hesitated to answer. He was afraid that speaking of his hopes might shatter them. They walked past the entrance to the school and turned the corner before Yakov spoke again.

"I won't push you to say anything. Dreams can be fragile things. But what would you say if Yitzach and I spoke about a match for you?"

"Gitele?" Yossie said, surprised.

"In Tractate Kiddushin, it says that a father shouldn't marry off his daughter until she is grown and says who she wants. That is how it is."

"And you, you and Yitzach approve?"

"You must talk to him about that," Yakov said, smiling. "I think, perhaps, that I will turn here, but you may want to go back to the bridge over Buffalo Creek. Yitzach said he would be there with his family doing *Tashlich*."

Yossie grinned. "A good year, *Rav* Yakov!"

"A good year, and may you be inscribed in the book of life," Yakov called, although it wasn't clear that Yossie heard him, he was walking away so quickly.

\* \* \*

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## Stretching Out, Part Three: Maria's Mission

Written by Iver P. Cooper

*Grantville, September 1633*

"You've heard the news, Mevrouw Vorst?" David de Vries brandished a folded copy of the *Grantville Times*. Maria Vorst turned to face him. "Who hasn't, Captain? Is it really as bad as the papers say?"



DAVID PIETERSEN DE VRIES.

"Probably worse. Over sixty warships destroyed by French and English treachery. " To a Dutch captain, especially one with the fighting reputation of David Pieterszoon de Vries, this was the worst possible news. He had friends aboard that fleet, friends now dead or fled to parts unknown. The Republic had needed him, and he hadn't been there.

Belatedly, he added, "Haarlem has fallen to a *coup de main*. And the Voice of America just announced that the northern provinces are said to be in revolt against the prince of Orange."

"What about Leiden?" That was Maria's home town.

"Not yet under siege, so far as the Americans know, but it's only a matter of time. It's bracketed by Spanish forces at Haarlem to the north and Den Haag to the south."

"My brother . . . and his wife . . ." Maria's voice quavered.

"There was no massacre in Haarlem, or Rotterdam, at least. And Leiden is hardly likely to offer resistance. So there is no reason for the Spanish army to adopt . . . stern measures."

"And the prince, he will want to protect the university, surely."

"Probably. Although if your family was prudent, they probably fled to the countryside. They certainly had enough warning."

"I hope for the best." Maria paused. "And your wife?"

"She is in Hoorn. The Spanish will probably check to make sure that no warships are hiding in its harbor. Otherwise, I don't think it will be directly affected by the fighting. The Spanish will land more troops at Egmont, and move them south to complete the investment of Amsterdam. Once the siege line is drawn close to Amsterdam, Hoorn will be militarily irrelevant."

"That sounds promising . . . as much as anything can be promising in these evil times."

"But, Mevrouw Vorst, you realize that this means that we can't go to Suriname after all."

"Why not?"

"It is my duty to fight the invaders. My ship, the *Walvis*, is in Hamburg, and it is well armed; it was outfitted as a privateer. I can attack the Spanish supply ships; perhaps send small boats into Amsterdam."

"That is courageous of you."

David bowed.

"But Captain, is that really the best you can do against the Spanish?"

David bristled. "Surely you don't expect me to attack the Spanish fleet, singlehandedly."

"No, no, that's not what I meant at all. From what I hear, the only thing that can prevent the ultimate fall of Amsterdam is if the city is relieved by the Swedes and their American allies. Is that true?"

"Well." David dropped his eyes, then raised them again. "The city is well stocked against a siege . . ."

"Captain . . ."

"The fortifications are in excellent condition. . . ."

"Really, Captain. . . ."

"Well, of course, Amsterdam would fall, eventually. If disease, or a Swedish relief force, or some crisis elsewhere, didn't force the Spanish to pull back. But it could hold out for many months."

"It seems to me that your ships could be put to better purpose than sinking a Spanish supply ship here and there. Bringing tar from Trinidad, and rubber from Surinam or Nicaragua, to keep the American APCs running."

David took a deep breath, expelled it slowly. "I suppose there is something in what you say. I see it is not enough for you to be a science officer, you have aspirations to be a general, too."

"War is too important to be left to men," she quipped, smiling. "Logistics is not their forte."

"Okay, I'll think about it."

\* \* \*

David's original plan had been to simply transfer his rights as a patroon of the Dutch West India Company from Delaware to Suriname. The Dutch defeat at Dunkirk, and the subsequent fall of most of the Republic, had changed all that.

Raising the Dutch flag over a new colony was now more likely to invite attack by English and French opportunists than to deter it. So after extensive negotiations, a "United Equatorial Company" had been formed, under the laws of the New United States. Those laws were based on the U.S. Constitution, and thus banned slavery. The up-time American backers insisted that the corporate charter also ban slavery, since the political fate of the NUS was somewhat uncertain.

There was the practical problem that the NUS flag might not be recognized. Hence, as a additional diplomatic fig leaf, David obtained the right to have his ships, and the colony, fly the Swedish flag, too. Not that David was getting any troops or money from Gustav Adolf. Still, it would be a warning that Sweden might officially take notice of any harm done the colony, and the better Sweden did in the wars, the more others would fear to give it an excuse to retaliate.

\* \* \*

"Thanks, Philip," said Maria, balancing a stack of books. "This will really be helpful."

"You're welcome," he said with a smile. He blinked a few times. "Do you like Westerns? They're showing *High Noon* this Friday."

"That might be nice. I'll have to ask Prudentia what her plans are."

"She can come, sure."

"I'll ask Lolly. She'll appreciate the excuse to get out of the house." Maria was staying with Lolly, the middle school science teacher. Currently pregnant.

"Uh. . . . I was thinking that we could celebrate your completing the sugar report."



"That would be nice. So we should ask Irma and Edna. They told me so much about sweet sorghum and sugar beet. And Rahel should come, too."

Philip blinked again. "I suppose."

"And of course the Bartollis. Lewis and Marina, I mean." She gave him a wink. "Don't forget to invite your sister Laurel. Evan, too, perhaps?"

"Yeah. . . . I'll ask them. Well, uh, see you Friday." He turned toward the door.

"It's a date!" she called out after him.

\* \* \*

*It's a date, she said, Philip thought. Yahoo!*

Philip needed something to cheer him up. It had only recently hit him that in just a few months, his gang, the "Happy Hills Six," would be split up; most would be going into the military, and who knows where they would be stationed. Or what would happen to them there. His mother had been driving him nuts about it, too. It had been bad enough when Laurel went into the army—and jeesh, she was in Telephone and Telegraph, not exactly on the front lines—but Philip was the baby of the family and Momma was always bringing it up. And then there were Grandpa Randolph's health problems. He was seventy-five years old, but until recently in great condition for his age. Thanks to all that hunting and fishing, Phil figured. But he was bed-ridden now, and Momma fretted over that, too. Phil wished, really wished, he could just, like, *move out*. If it hadn't been for the Ring of Fire, he could have solved the problem by going to college some place far away. Like Cleveland.

\* \* \*

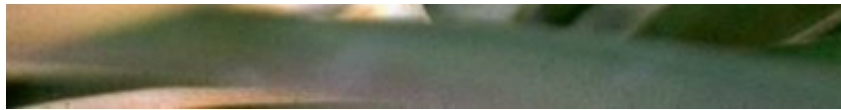
"How's your report coming along, Maria?" It was Prudentia Gentileschi, the daughter of the famous Artemisia, and an up-and-coming artist in her own right.

Maria greeted her friend with a kiss on each cheek. "Almost done. It would help if the investors didn't keep changing their mind as to what they wanted to know." Maria, the daughter of the curator of the Leiden Botanical Gardens, had come to Grantville to study botany, and had gotten enmeshed in De Vries' plans to establish a new colony on the Wild Coast of South America. Somewhat grudgingly, he had accepted her as his "science officer," as one of the up-timer investors had titled her.

Prudentia smiled. "Believe me, painters working on commission have the same problem."

Maria showed Prudentia the report. "As you see, it covers pretty much everything the colony might grow, for itself or for export. Various kinds of rubber trees, sugarcane, cacao, coffee, cotton, dye plants, rice, pineapples, bananas, manioc, oranges, coconuts—you name it."





Prudentia gave it a once-over. "Impressive."

Maria shrugged. "I couldn't have done it without Philip Jenkins' help. He knows so much about trees, and of course he's actually seen, and eaten, pineapples and bananas."

Prudentia gave Maria a knowing look. "I bet he's been helpful."

"What do you mean by that?"

"Don't pretend to be obtuse. You know what I mean. I think he likes you."

"Yes, we're friends."

"That's not what I meant. I think he's courting you."

"That's ridiculous. I am in my mid-twenties, and he is what? Fifteen?"

"Sixteen. And a half."

"That's right. He did say that the first time we met."

"He has probably been saying it to *someone* every day since attaining that lofty age."

"Anyway, he's not the only lad who helped me. There's Lewis Bartolli, the chemistry 'whiz kid,' who did the write-up on aluminum, bauxite and cryolite. And his sister Marina has done a lot of typing for me." She paused. "You know, maybe Phil is interested in Marina, and is using his visits as an excuse to see *her*. She's pretty, in a dark sort of way, and just a little younger than Philip, so she's the right age for him. And she is the daughter of the Bartolli of Bartolli's Surplus and Outdoor Supplies, while Philip is a hunter and fisherman. Since Lewis Bartolli isn't going into the family business, perhaps Philip sees an opportunity there. That would be sensible."

"Yes, that *would* be sensible." Prudentia didn't sound convinced.

"By the way, who's that kid that's been making googly eyes at you at Dinner and a Movie?" asked Maria.

Prudentia blushed. "His name's Jabe, and he's not a kid. And he's not making googly eyes. In fact, he can hardly look at me."

\* \* \*

Maria was walking down Buffalo Street, on her way to Hough Park. She stopped suddenly. Wasn't that Rahel's friend Greta in front of her? And the guy she was with was, what's his name, Karl? He was handsome, but Maria had heard bad things about him. Should she join them? No, that probably wouldn't work. She could follow them, but what could she do if there was trouble? She was no martial arts expert.

Then she saw Philip on a side street. The answer to her prayers. "Philip, come join me." Philip was brawny—he played American high school football—and knew how to fight.

She linked arms with him. "Walk with me," she commanded. "And talk."

"About what?"

"Umm. Coconuts. Pineapples. Tropical stuff."

"Okay." She let him drone on while she kept her eyes on Greta and Karl. At last, Greta and Karl parted—not without some squirming on Greta's part—and Maria breathed a sigh of relief.

"Did you say something?" asked Philip.

"Thank you, this was lovely. Sorry, but I have to run. Bye!"

\* \* \*

If it wasn't one thing, it was another. The latest problem was a political one. The Company had been chartered under the laws of the New United States, which, at the time was a sovereign state. But now the NUS was merely a part of the United States of Europe. So was the charter still valid? And if the NUS prohibited slavery on its soil, but the USE had yet to speak on the issue, was slavery forbidden in the colony?

The lawyers whom David consulted gave him an extremely learned, expensive and authoritative "maybe."

\* \* \*

When David arrived in Hamburg, where his ship was docked, he discovered a letter waiting for him. He opened it. It read, simply, "Bring back bauxite." The letter was unsigned.

But he recognized the handwriting. It was that of cousin Jan. Who, last David heard, was in the employ of Louis De Geer. Mister "I-am-sending-ships-to-the-Davis-Strait-to-hunt-whales-and-maybe-mine-a-little-gold-in-Greenland." Even though he was a metals magnate, with no previous interest in whales. And even though the up-time books said nothing about gold in Greenland.

But they sure said plenty about Greenland being the only source of cryolite. The critical flux for making aluminum from alumina. Which in turn was made from bauxite.

David decided to buy some more shovels and picks. Right away.

***North Sea, December, 1633***

David and his band of sailors and colonists left Hamburg on a blustery, rainy December day. It was an uncomfortable time of year to venture out on the North Sea. But that was an advantage, too; the Spanish war galleons weren't especially seaworthy and tended to spend the winters in port.

David was once again captain of the *Walvis*, a four hundred ton fluyt with eighteen guns. As its name implied, it was a whaler, but it was also a licensed privateer. And, just as on his last journey, the *Walvis* was accompanied by the *Eikhoorn*, a twenty ton yacht.

The Company had doubled his force by adding the *Koninck David*, a two hundred tonner with fourteen guns, and a second yacht, the *Hoop*.

It was the ideal combination of ship types for making the dangerous run south to Africa to pick up the trade winds for the Atlantic crossing. The Barbary corsairs ranged from the English Channel to Cape Verde, always hoping to capture an imprudent European ship. If they did, all aboard, crew and passengers, would be held for ransom, or simply sold as slaves at the marts of Sallee or Algiers.

The yachts could scout ahead, warning the flotilla of danger, and in turn they could shelter under the big guns of the fluyts if they encountered any formidable foe. They would come in handy in the New World, too, being ideal for inshore work.

Some investors in the Company had been more intrigued by David's descriptions of the profits to be made from privateering than in the more prosaic plans to tap rubber and mine bauxite. They had prevailed on their fellows to beef up the crews, so that David would have additional manpower for working the cannon, adjusting sail, and boarding enemy ships (or repelling boarders). That was good.

Unfortunately, David felt a bit betwixt and between. He had more men than was truly economical for the operation of a fluyt, but not so many as would be on a true privateer on a short range hunting mission. And his ships were larger, and therefore less handy, than the piratical ideal.

David was well aware that this uncomfortable compromise was the natural result of decision making by committee.

"Captain, we have a stowaway."

David looked at his cousin, Heyndrick. "He must be very ingenious to escape detection this long."

"I suspect it was more that he was very generous to a sailor or two. He is a young American, and many of them are rich."

David started swearing. "And no doubt he is on board without parental permission, and his parents will be raising bloody hell with my investors. Bring him to my cabin."

A defiant young American teenager was brought in a moment later.

"What's your name, and age?"

"Phil Jenkins. I'm sixteen. And a half."

"Sixteen, huh?"

"And a half," Phil reminded him.

"That's young for an American to leave home. Do your parents know that you are here?"

"I mailed them a letter. From Hamburg. Anyway, I'm old enough to join the army, so why can't I go overseas?"

"So . . . you stowed away because you want to see the world? Or perhaps you have seen one of those romantic American movies about pirates, and fancy yourself with a black eye patch and a parrot on your shoulder?"

"I know a lot about trees, and stuff like that. I thought I could help Maria—"

"Maria, huh? Would you be as keen to look at trees in Suriname if Maria weren't on board?" Phil colored. "I knew having Maria on board was going to mean trouble," David muttered. "I don't suppose you have any nautical skills?"

"Well, Grantville was located about two hundred miles from Chesapeake Bay. But I know how to hunt and fish, and I can handle a small boat. . . ." Phil paused. David's stern expression was unchanged. Phil's voice trailed off. "On a river or lake."

David waved toward the porthole window. "Does that look like a lake to you?"

"No, sir."

David studied Philip, and decided that he was not entirely unpromising material for a colonist, or a mariner. Still. . . .

"All right. You're more trouble to me than you're worth. I can't afford to turn around—we waited a long time for a northeast wind—but as soon as we see a friendly ship heading toward Hamburg or Bremen, you're out of here. If you can't pay for the passage, you'll write me a promissory note, and I'll give you the money."

"But sir—"

"No buts. This is not your American legislature; there is no debate. Cousin, find a place for him to swing a hammock, and keep him out of my hair."

\* \* \*

Maria couldn't believe it. Philip had snuck on board to be with her.

It made her feel like, like . . . reaching into his throat and pulling out his intestines. Not that his *intestines* were the root of the problem, anatomically speaking. Teenage boys, *arggh!*

She admitted to herself that it made her feel good that he was so interested in her. After all, she was ten years older than him.

But did he have any idea what sort of position it put her in? The crew and colonists would have had difficulty enough accepting an *up-time* woman in a position of authority. But the up-timers all acted as if they were nobles. Maria was educated, and of good family, but not of the nobility, nor someone whose past achievements would force them to overlook her gender. The captain had only grudgingly accepted her, after witnessing her kayaking stunt . . . not that the demonstration had the slightest bit to do with her competence as a botanist, a healer, an artist, or a geologist!

And now the captain would be wondering if this trip to the New World was just her excuse for eloping with Philip. And everyone else on board would be wondering the same thing.

Well, she was going to have to have a little talk with Philip. Once she had calmed down enough not to throw him overboard and make him *swim* back to Hamburg.

But it was nice to know that he thought she was attractive.

\*\*\*

Carsten Claus sat on a capstan and watch the sailors going about their work. The other colonists had decided that the water was a bit too rough for their taste, and had retired to the *zwischendeck*. Carsten, however, had once been a sailor himself, and he had quickly recovered both his sea legs and his "sailor's stomach."

His fellow colonists were mostly Dutch and Germans, displaced by the war. Happy people don't pack their belongings and make a long and difficult journey to a wilderness reportedly populated by cannibals and savage beasts. Even if rumor also had it that there is gold to be found somewhere in that wilderness. The practical Dutch and Germans just didn't put much stock in stories of El Dorado. So the colonists were people with problems back home that they needed to escape, or with more than their fair share of wanderlust.

Of course, there was a third possibility. A few could be spies, or agents provocateurs. Carsten was an organizer for the Committees of Correspondence (CoC), the revolutionary organization which, with American encouragement, had spread across much of central Europe.

Andy Yost had briefed Carsten on how important it was to have a colony which could export rubber, bauxite and oil to the New United States. Oops, Carsten meant the United States of Europe. Just before the expedition left, the once-sovereign NUS had become a member state of the USE.

In Carsten's opinion, some of the CoC members greatly exaggerated the ubiquity of Richelieu's spies. In fact, at a CoC meeting, Carsten had once rapped on a closet door, and yelled, "Cardinal, come out right this minute." That had a gotten a laugh, albeit a somewhat nervous one.

Carsten had to admit that it was at least conceivable that the colonists had been infiltrated. So one of Carsten's jobs was to check their bona fides. By now, Carsten was sure that they were all okay. Well, reasonably sure.

He had also made some progress with respect to his long-term business, which was "education." Gently indoctrinating them in democratic principles, and forming a new CoC cell to make sure that the colony didn't venture onto dangerous ground. Like slaveholding.

When their ship entered the dangerous waters between Cape Finisterre and the Cape Verdes, he had reminded the colonists that these were the haunts of the Barbary Corsairs.

He acknowledged that they couldn't have a better captain than David de Vries, who was famed for having fought off the Turks when they outnumbered him two-to-one. But he asked them to pray for his fellow sailors who were less fortunate, who had been forced to surrender and whose families could not ransom them from slavery. They did so, and if they added a prayer or two for themselves, he couldn't blame them.

And then, as they prayed, he asked them to pray for the Africans who had been enslaved in the New World by the wicked Spanish and Portuguese.

When one of the colonists was bold enough to retort that the Africans couldn't expect better treatment, being pagans, and probably cannibals at that, Philip had hotly complained that putting chains on the blacks wasn't the best way to teach them about the benefits of Christianity.

\*\*\*

The ship was running before the wind, which meant that the captain's cursing was carried down the length of the ship. The crew was practically tiptoeing.

Philip gave Heyndrick an anxious look. "What's got the captain upset? It isn't me, again, I hope."



"No, no, it's not you. The captain got all these newfangled navigation instruments in Grantville. Most of them work fine. The sextant, it beats a cross-staff any day. Maybe ten times as accurate, and you don't go blind trying to sight the sun."

"So what's the problem?"

"The clock. It's supposed to keep Nuremburg time, so we can calculate our longitude. It worked just fine . . . on land. And it's supposed to work at sea. Uses springs, not a pendulum."

"But. . ."

"But whoever designed it never tested it at sea. Or at least, not on waters this rough. We know where we are, more or less, from soundings, and either the clock is wrong, or our computations are. And since the captain's figures and mine agree. . . ."

"How bad an error are you talking about?"

"Well, the old pendulum clocks, if you took them to sea, accumulated ten or fifteen minutes error a day. This one, oh, a minute or two. But an error of one minute clock time still throws off the longitude by"—he frowned for a moment—"seven and a half degrees. A few hundred miles. And after a month at sea, the clock won't even tell you which *ocean* you're in."

"Really. In that case, I have a proposition I want to put before the captain."

"Pardon me if I wait here. I have no desire to join you on the execution block."

\* \* \*

"Captain, you don't want me to leave," Philip said.

David turned to face him. "Oh? Why the hell not?"

Philip took a deep breath. "Because of this." He pulled back his sleeve.

David didn't understand, at first. Then he did. Philip was wearing a wristwatch. A timepiece which worked at sea would let David accurately determine his longitude each day. If the timepiece kept the correct time for a place of known longitude, like Grantville, then it could be compared with the ship's local time, inferred from the position of the sun, to find the ship's longitude.

"How accurate is your watch?"

Philip hesitated. "I'm not sure. I guess it might lose or gain a few minutes a year."

"A year," repeated David dumbly.

"Yep," Phillip affirmed, this time more confidently.

David took a deep breath. "You are offering me your watch in return for the passage, and your maintenance in the colony?"

"Are you kidding? I bet this watch is worth more than your entire ship."

"Not this ship." David said. But he couldn't help thinking, *But it is worth as much as one of the yachts. And it would be worth a lot more if only I could shoot the sun with equivalent accuracy.*

Philip clarified his position. "What I meant was that I—and my watch—would be at your disposal for the duration of the voyage."

"Aren't you worried that I might just seize it from you? Or perhaps contrive your murder?"

Phil took a step back. "I . . . The things I heard about you . . . I didn't think you'd do something like that. You could have killed the Indians who wiped out the Swanandael settlement, and you didn't. At least, Joe Buckley said you didn't."

"You might bear in mind that Joe Buckley got the story from me. But you're right, I didn't. And I won't. But I would advise you to be very cautious who you show that watch to.

\* \* \*

"Philip." She stared at him, eyes half-slitted, fists on hips.

He either didn't recognize the warning signs, or chose to ignore them. "Hi, Maria, I'm—"

"Why are you here?"

"Isn't it obvious? We've been seeing each other a while, and I couldn't stomach your being away for a year, maybe forever."

"Seeing me? You mean courting me? Dating, as you call it?"

"Well, yeah."

"But you never wrote to my brother, and asked his permission to court me. Or even asked Lolly, whose roof I live under."

"Jeesh, guys haven't done that for, I dunno—"

"Centuries? Almost four centuries? As in, the way it was done back in 1633? Oops, it *is* 1633, isn't it?"

"Well, you've lived in Grantville for two years, so it didn't occur to me—"

"Didn't occur to you to say anything to me, either."

"You mean, like saying, 'Will you be my girlfriend?' or 'Would you like to go steady?' That's so old fashioned, you know. Kids my age just hang out, and that's what we were doing."

"Philip. Listen to me. What do you think *my* age is?"

"I don't know. College age? Nineteen? Twenty?"

"I am twenty six, Philip. I am ten years older than you."

"Not quite. I am sixteen and a—"

"Yes, I know! Sixteen and a half!" Maria took a deep breath, let it out slowly. "I have been married once, and widowed, already."

"Sorry, I didn't know. Gee, you look terrific for someone your age."

"Thanks—I think." Maria felt herself losing control of the conversation. "Philip, yes, you came to visit me a lot, but I thought that was because we were friends, not boyfriend and girlfriend. And because you were interested in my work. And maybe because Marina was helping me."

"Marina? She's never said a word to me in school." Philip paused. "Do you have a boyfriend already? I mean, someone other than me."

"No, Philip." He looked relieved.

Maria decided to seize the bull by the horns. "So what did you hope to accomplish by coming on board?"

"I guess . . . I guess I really wanted to impress you. You know, make a really big romantic gesture." Philip's cheeks were as red as apples.

"Well, you impressed me, but not with your maturity. You didn't try to find out how I felt first, you left your parents worrying—"

"I left them a note."

"Believe me, that just gives them something new to worry about." Maria threw up her hands. "Really, Philip. This is like, like *stalking* me. Go think about it. In private."

\* \* \*

Philip was not a happy camper. Everything had gone dreadfully wrong. Maria thought he was a *stalker*, for crying out loud. Philip thought he would *die*.

He lay in his hammock, listening to the creaking of the hull, and tried not to cry. Eventually, he fell asleep.

When he awoke, he resolved that he would ask the Captain to flag the next Hamburg-bound ship, after all. He went up to talk to David.

David didn't buy it. "We made an agreement, young man, and you need to stick to it. Unless you are willing to give up your watch."

"Well . . ."

"I thought not. You have skills which are useful to this expedition, and I expect you to apply them. Whether you love or hate Maria is

of absolutely no interest to me. The two of you work it out."

\* \* \*

"Heave-to!" The *Walvis* turned into the wind, and stalled. A few minutes later, the other ships followed suit. David sent more lookouts aloft, in case Barbary corsairs came sniffing around, and went to the poop deck.

Philip had no particular duties at this moment, and decided to see if David was in the mood to explain what was going on. He found David peering across an odd-looking compass. It had the usual compass needle and card, but mirrors and slotted vanes were mounted on an outer ring. "What's that?"



"An azimuth compass. One of your up-time ideas, but made in Nurnberg. It's for measuring the compass bearing of an object. A landmark, or, if you fiddle with the mirror, a heavenly body."

David turned the ring, and squinted through an opposing pair of slits. "There's the Pico de Fogo, the 'Fire Peak' of Ilha de Fogo." A plume of steam rose from it. Plainly, it was a volcano. He adjusted the azimuth circle, and took a second reading. "And Pico da Antonia, on Ilha de Santiago." The two islands lay near the southwestern end of the Cape Verdes island chain.

"With cross-bearings, I can find our exact position on both your up-time map—it had a little inset of the Cape Verdes—and on my old chart." David looked up at the sky. "It's getting close to noon, we'll take a sun-sight, and then see how good your timepiece is." David waited until the sun seemed to hang in the sky, and then measured its altitude. Philip called out the time. Grantville Standard Time, that is. GST had been proclaimed by the government after Greg Ferrara had determined Grantville's new longitude.

"Follow me." David walked across the gently tilting deck to his cabin, Philip following in his wake. Philip watched as David laboriously calculated the latitude and longitude.

"Hmm, pretty good. In fact, so good as to earn you an invitation to the captain's table for dinner tomorrow."

By then, Mount Fogo, the highest peak of the Cape Verdes, had disappeared below the horizon, to the north and behind the *Walvis* and its companions. Its plume was just a smudge, almost lost in the horizon haze. The great mass of Africa lay only four hundred miles to the east; the wide Atlantic separated them from the Americas to the west.

Over the meal, David explained just how Philip's wristwatch was going to help them on the next leg. He unrolled a map. "Most ships, if Caribbean-bound, would have turned west from Fogo, run down the fifteen degree line to Dominica."

Philip nodded politely. He could see the small speck marking the location of Dominica, on the near edge of the West Indies, but he knew nothing about it.

"But that's not the best sailing for us," David explained. "We'd have to fight our way southeast, against the current, to get to Suriname from Dominica."

"So why not go further south, and then turn west?"

"Spoken like a true landlubber," David said, smiling to take out the sting. "If we went south to the latitude of your up-time town of Paramaribo, we would hit the doldrums. Do you understand that term?"

"No wind?"

"Often, nary a breath. Duppy Jonah's Flytrap. You can be stuck there for weeks, as your provisions spoil and your men's tempers do the same. The belt of doldrums moves north and south with the sun; that's one of the reasons we set sail in winter."

David paused for a bite. "With your fancy wristwatch to help us find our longitude, we can curve gradually south as we head west, hit South America here." He jabbed his forefinger against the spot marking the up-time town of Cayenne, French Guiana. "We don't have to sail down a latitude line anymore."

\* \* \*

"Philip, congratulations. Heyndrick told me that we made a very difficult sailing, thanks to your navigational help."

"Thanks". Philip kept his back to her.

Maria waited. "Is that all you're going to say?"

"Yep."

"When you're tired of being a jerk, come and talk to me." Maria stalked off.

"Wait, Maria," called Philip, but his voice was lost in the wind, and he didn't want to follow her and endure the catcalls from the sailors.

### ***The Wild Coast of South America, Early 1634***

Their first view of Suriname was discouraging. As they cruised northwest along the Surinamese coast from Cayenne, they saw mile after unbroken mile of mangrove swamp. It didn't look like a place the colonists would want to visit, let alone live.

At last, David led his small flotilla into the mouth of the Suriname river. Here, it was really more than a river, being several miles in breadth. They headed south for what the maps had shown to be the location of the twentieth-century capital of Suriname, Paramaribo, twelve miles upriver. The "Great Encyclopedia" said that it had been settled in the old time line in 1640, and it seemed that the location couldn't be that bad if it had remained in use for over three centuries. And it added that the site was "on a plateau sixteen feet above low water level, well drained, clean, and in general healthy." Even here, the river was a mile wide, and eighteen feet deep.

They solemnly raised the flag, and David christened the town "Gustavus." Gustavus Adolphus was a hero to the Dutch and Germans, and the christening was a cheap price to pay for the Swedish support.

There were signs of a former Indian settlement on the plateau. Whether its abandonment was a heavenly blessing, or a warning, they couldn't say.

In the days following the landing, they explored the countryside. Despite appearances, the marshes were just a narrow strip on the coast. Behind them, lay an area of *zwampen en ritsen*: swamps and ridges. They weren't sure just how far that terrain extended, but the up-time encyclopedias had told them that if they went far enough south, they would find savannas and the great rain forests.

They had deliberately arrived at the beginning of what the encyclopedia called the short dry season. That, they knew, would be the best time to clear ground. And, once they found it, to mine bauxite. In March, when the long wet season began, they would plant their crops—tobacco, cotton, and various food crops, by preference.

There had been much debate back in Grantville as to how to solve the perennial labor problem of tropical America without resort to slavery. It had to be solved, because the tropics had products which Grantville desperately wanted, like rubber. Part of the proposed solution was to use up-time medical knowledge so that Europeans wouldn't die off so readily.

Maria's father and brother were physicians, and the botanical garden at Leiden, which she knew so well, was primarily a garden of medicinal plants for the education of the student physicians. So she knew her herbs. In Grantville, she had learned more about disease, and how to avoid it. On the ship, she had insisted that the sailors and colonists eat sauerkraut, to ward off scurvy. On shore, she lectured the settlers on mosquito control. And sanitation. Several of the colonists had gotten some medical training, too, since Maria wasn't planning a permanent stay.

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Carsten Claus and Johann Mueller walked along the wooded ridge line, grateful for the shade which the scrub forest provided. Even though they were miles from the sea, there were shells and shell fragments everywhere.



Carsten bent to pick up a particularly interesting one. It was egg-shaped, and mottled-red in color, and it shone as though it was made of the finest Chinese porcelain. It was a cowry, a snail shell. Like the cowries of Africa, which Carsten had seen in his former sailing days, it had a ribbed slit opening. In Africa, that made it a fertility symbol.

Frau Vorst was right, Carsten thought, this must be an ancient sand dune. Carsten decided to save the shell for her; she loved to collect curiosities. He also decided not to say anything about its symbolic significance.

Johann Mueller, a glassmaker, was more interested in the sand. Every so often he would pick up a handful and bring it so close to his eyes that Carsten wondered whether Johann was nearsighted.

It wasn't common for fledgling colonies to have glassmakers, although Carsten had heard that there was one in Jamestown, Virginia. But it was the second part of the master plan to make a tropical colony viable without resort to slavery.

The up-timers knew they had to find a way to get the local Indians to work, day in, day out, without coercion. And Captain De Vries, who had been to both North America and the Caribbean, told them that there was only so much one could accomplish with the standard

trade goods. An Indian might work to acquire one steel knife, but he didn't need a dozen. Strong liquor was a possible lure, but it had its own disadvantages.

Knowing that glass beads were a good article of trade, the Company had decided to coax a glassmaker to join the colony. That way, they could sell or barter a variety of glass articles, not just beads, and not just to the Indians, but also to Europeans in Guyana and the islands.

On the long voyage over, Carsten had delicately drawn out the details of Johann's background. Johann was a Thuringer from Lauscha, a journeyman with many years experience, who had failed to make master. Solely for economic reasons, he assured Carsten. He hadn't botched his masterwork or been caught seducing his mentor's daughter.

Carsten was inclined to believe him. You could only become a master in a guild if you found a town whose guild chapter had a vacancy. Because of the war, the demand for glassware had declined, and masters who were scrounging for work weren't likely to welcome a newcomer.

"In this Suriname," Johann said, "I don't have to marry an ugly old widow just to get her husband's shop. And I don't have to worry about competition."

*Just about pirates, Indians, jungle beasts and tropical diseases,* thought Carsten, but he kept the thought to himself.

"Oh, look at this," Johann chortled. This sand, it's almost a pure white. And look at the size of the grains. They are so even, it's beautiful."

Carsten was reminded of the adage, *Beauty is in the eyes of the beholder.* But that, too, he kept to himself.

\* \* \*

"Captain, the plan won't work. It's hopeless. You should just take me back to Hamburg." The speaker was Denys Zager, the master sawyer hired by the Company. They knew that Suriname had plenty of wood, so why not sell wood articles to the Indians? Things they couldn't make with their primitive tools. And Zager's planks would also be used for constructing buildings and furniture for the colonists. Zager would cut the wood and the colonist's carpenter would do the fine crafting.

Unfortunately, the person who *hired* Zager, on the Company's behalf, wasn't the one who had to *work* with Zager. That is, poor David. Zager was the sort of person who, if he found a pot of gold at one end of the rainbow, would complain that there wasn't another pot at the other end.

David sighed. "What's the problem?"

"The Company wants me to build a wind-powered sawmill. Like the one Cornelis Corneliszoon had invented in 1593. A wonderful idea.

"And the Grantville-made saw blades are satisfactory, I suppose." They were, of course, better than anything he had seen before, of course, but Zager would never admit it. They had been provided on the theory that it was better to use steel to make saw blades and use them locally to manufacture wood articles, than to make steel trade goods which would have to be produced at home.

"Only . . . where's the wind? All we get here is a light breeze."

"What about using a water wheel? "

"Well . . . the most efficient water wheel is an overshot. Water comes down from above, onto buckets. But you need a decent drop, and where's the drop?" Zager waved his arm toward the placidly flowing Suriname River. "Not there, I assure you."

David shrugged. "Come with us upriver, perhaps we can find you a waterfall there. We know from the up-time maps that there are mountains to the south."

"You want me to live alone in the wilderness, tending my mill by this yet-to-be-located watermill of yours? You will keep me supplied with food and lumber, come instantly to my aid if the Indians attack?"

David started to answer, then thought better of it.

Zager looked triumphant. "I thought not."

David rubbed his chin. "You said, the 'most efficient' wheel. So what are the alternatives?"

Zager said nothing.

"Well?"

Zager sighed. "I suppose we could make do with an undershot wheel. If we must. It just needs flowing water, to strike the floats." He spat. "But this river is rather slow-flowing. We won't get a lot of power out of it."

"Then we will find you a livelier river. Or we will have to bring you oxen, or donkeys. And, until then, if you don't want to hassle with an undershot wheel, you can saw the old-fashioned way, in a pit with a platform over it."

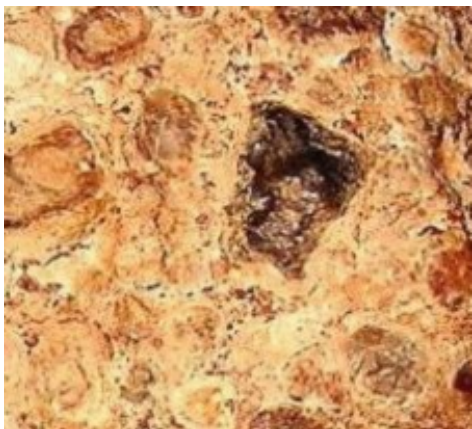
"Hmmp. At least as the senior man, I'd be at the top of the pit, where I can breathe. But all right, we'll try the undershot wheel. Once I figure out where the current is strongest. . . . Probably by falling in and drowning."

\* \* \*

Heinrich Bender, formerly of Heidelberg, was clutching a piece of sketch paper in one hand, and a rock in the other. "Frau Vorst, Frau Vorst, we found it!"

Maria looked up. "Bauxite, you mean?" The sailors and colonists were searching creek beds and other rock exposures in the vicinity of

old time line Paranam, some miles south of Gustavus, because the up-time encyclopedias had said that bauxite was mined there. Maria had divided them into groups, and given each a "Wanted" sketch showing what bauxite looked like. Maria, who was an experienced artist, had made the drawings back in Grantville, basing them on photographs in various up-time field guides owned by the school libraries.



Heinrich nodded.

"Let's see." He handed her the paper and the rock. Maria compared her sketch with the specimen. The sketch was deliberately done in charcoal, to avoid misleading the searchers—bauxite could be white, yellow, red, or brown. This specimen was red.

For bauxite, the telltale sign was its "raisin pie" texture. Okay, the up-timers called it "pisolitic." Yep, the pisolites—little pea-sized concretions—were present in Heinrich's find.

Heinrich was fidgeting with excitement. Maria wasn't surprised; David had promised a bounty to the first person to find bauxite. "Well, is it bauxite? Is it?"

"Looks promising, bear with me." Maria tried scratching the rock with her fingernail. She brushed away the white powder to make sure that it was the rock, not her fingernail, which had succumbed. Yes, there was the scratch. That meant that on the Moh's scale of hardness, the rock was less than 2.5. Bauxite had a hardness ranging from 1, like talc, to 3, like calcite. A bit harder than most clays.

What else? Right, specific gravity. She hefted it; it seemed to have about the right density, two or two-and-a-half times that of water. She could measure it when she went back on board the yacht, but clearly it was in the ballpark.

"Good work, Heinrich," Maria said. "Show me where you found it."

"It was over here . . . no, over there."

Maria saw a second rock, much like the first. She called over some more of the colonists, and set them to work digging test holes near the find, so she would know how deep the formation was. And then she wrote a note to David, and sent Heinrich off with it to claim his reward.

\* \* \*

The formation turned out to be enormous in extent; miles wide, and usually just a few feet below the surface. In places, powdered bauxite, or so Maria presumed it to be, actually turned the soil to a dark purple-red, as if someone had soaked it in beet-juice.

Out came the shovels, the pickaxes, and the wheelbarrows. For now, all they did was collect the bauxite. If the market for bauxite took off—meaning, someone succeeded in duplicating the Hall-Heroult process of making aluminum—then they would see about converting bauxite to alumina right in Suriname. Four tons of bauxite made two of alumina. That would reduce transportation costs—if the necessary reagents could be produced by the colony.

The Company even hoped that one day it could harvest the power of the cataracts of the Suriname river to produce electricity. If so, then they might actually be able to produce aluminum locally. Two tons of alumina, with great gobs of electricity and a dash of cryolite to reduce the melting point of the alumina, would make one ton of aluminum.

For that matter, she had been told that alumina made a great refractory. So even without cryolite, the bauxite might come in handy. Be nice, Maria thought, if she could carry out a proper chemical test, but she didn't happen to have any cobalt nitrate handy. Hah, she might as well wish Gustavus had an atomic absorption spectrophotometer, while she was at it. At least, wonder of wonders, the high school in Grantville actually had one . . . an unlikely gift from a large construction material manufacturer. So when they got the ore home, the chemists could definitively determine that it contained aluminum.

Of course, David and Maria would feel kinda stupid if they carted twenty tons of bog iron home, when they were looking for bauxite.

\* \* \*

Finally. Maria could get on with her real work. Documenting and collecting the extraordinary plants of Suriname, for the greater glory of the Leiden Botanical Gardens. Which she thought of as the family firm. Not without reason; her father Aelius had taken it over in 1599, and then her brother Adolph in 1624.

She would start close to town, on the coastal plain, and ultimately have David take her upriver, to explore the rain forest.

For documentation, she had her pencils, chalks and paints, and her leaf press. But live specimens would be better yet. She collected both seeds and seedlings. The seeds were mixed in with charcoal, or sawdust or sand, and placed in bags. Those, in turn, went into what she hoped were insect-proof boxes. If she found any rubber tree seeds, those would get treated with fungicide and go into one of her small supply of plastic bags. Seedlings could go into cases with glass sides and tops, so they could be kept moist and given the benefit of the sun during the long trip home.

Nor would she ignore the fauna. She drew pictures of some, and they had both live and dead specimens to ship to the savants and curiosity collectors back home. Philip had brought her, no doubt as a peace offering, a curious fish he had caught. It had four eyes. Well, not quite. It had two eyes, but each was divided into upper and lower halves. Philip told her that it swam on the surface, with the upper halves above the water.

Maria never tired of painting the wildlife. The birds, in particular, were beautiful. And even many of the insects. Some of the insects, she could definitely do without.

\* \* \*

David studied the mark in the sand bar. It was, quite clearly, the imprint of a European boot. He tapped the shoulder of one sailor, whispered to him, and sent him to collect the others.

Soon, they were back on the deck of the *Eikhoorn*. David, an explorer at heart, had taken command of the yacht, leaving its usual skipper to supervise the loading of bauxite ore onto the *Walvis*.

"We're not alone."

"Indians?" asked a crewman. He looked around nervously.

"No, Europeans. We don't know their nationality. If we're lucky, they're Dutch." While the colony was under the protection of Sweden and the NUS, it also had a license from the West India Company. Since David was a patroon of the West India Company, it hadn't been difficult to obtain. Especially since Sweden and the NUS were the only Dutch allies remaining.

"Listen up. If they're English or French, they won't know about the Battle of Dunkirk. Well, probably not. And while I am palavering with them, I don't want you to give away the information that they have any reason to fear us." David's crew was almost entirely Dutch.

"So, no insults, no glares, no nattering among yourselves as to how treacherous the English and French are. Have your weapons ready, but don't point them until I give you leave. Understood?"

He turned to Maria. "So much for the up-time encyclopedias. First settled by the French in 1640, my eye!"

\* \* \*

The *Eikhoorn* continued a mile or two upriver, but its crew didn't spot any signs of habitation, European or otherwise. They retraced their route, and this time went up a creek, rowing with muffled oars. It wasn't long before they heard voices. English voices.

David signaled a halt, and called out. "Hello, be you English?" There was an excited clamor, and several roughly dressed Europeans stepped out of the trees. They looked at him goggle-eyed.

"We are. We are Captain Marshall's men. Who are you?"

"I am Captain David de Vries, a patroon of the Dutch West India Company, currently in the service of His Majesty the King of Sweden and the New United States." That sounded impressive enough, he thought.

They murmured among themselves. One ventured, "I am sure Captain Marshall will want to entertain you. To hear news, if nothing else."

"When did you last have news?" David asked.

"A ship comes once each summer to collect our dried tobacco."

"Really? Do you have any left for sale? How much do you sell each year?" Their answer gave David some clue as to how many acres were planted, and thus, of how many settlers were engaged in tobacco cultivation. It was clear that the crew of the yacht was outnumbered. But not the colonists he had left down river.

"My friends don't speak English," David said. "Excuse me while I explain to them that I am going to pay a call on Captain Marshall." He then added, softly, in rapid Dutch. "Be on guard. Let none of the English on board in my absence. If I don't return by tomorrow morning, make haste to the settlement and warn them. From the extent of the tobacco crop, there must be several dozen English here, at least."

"Why are you visiting them? Wouldn't it be better to just come back in force?" asked Maria.

"It's a calculated risk. I need to see just how many of them there are, how well fed and armed, whether they have a fort, and more. And much more. Are the local Indians friendly or hostile? Are the English of the royalist or parliamentary factions? Are they Church of England, or Puritans, or even Catholics?"

\* \* \*

David was gone the rest of the day. A lone Englishman came back to the creek and informed them that David had been invited to dine with Captain Marshall, and spend the night.

Maria and the others could only hope that the messenger was telling the truth. Two men remained on watch at all times.

The next morning, while mist still shrouded the creek, David emerged, together with two of the English. They were better dressed than any of the men seen the day before. David said something to them, and they waited at the forest edge as he came up to the yacht.

"Captain Marshall and one of his colleagues, a Mister Francis Scott, will be enjoying our hospitality. Remember what I said about keeping your lips buttoned. I am fairly sure that Scott is being brought because he speaks Dutch—whether he says so or not."

"How many of them are there?"

"Sixty, all men. They have been here since 1630, and they cultivate tobacco. Perhaps half a mile up the creek they have a fort, with a wood palisade. But I need to get back to them, lest they grow suspicious. Fortunately, the custom in the Guianas has been for the few English, Dutch and French in the country to live in harmony, so they aren't expecting trouble.

"Mevrouw Vorst—"

"Please, Captain, by now I think you can call me Maria."

"Maria, ply Marshall and Scott with questions about the Indians, the animals, the plants, the weather, and the like. Philip, you can tell them about the wonders of Grantville. Stay off the topic of politics! All right, I better go fetch them now."

\* \* \*

"Ahoy, the *Walvis*! Captain De Vries and party, with two English guests," bellowed the first mate of the *Eikhoorn*.

The men on the deck of the *Walvis* stopped what they were doing, and stared.

"They don't seem happy to see Englishmen," Captain Marshall commented.

"The Dutch-English relationship has sometimes been a troubled one," David replied. "But you are my guests."

\* \* \*

Heyndrick and Philip were both on the deck of the *Walvis*. Heyndrick finished cleaning his fowling piece. Heyndrick looked up, and saw Philip sitting on the railing, a fishing rod in hand. He studied Philip for a moment, and decided he might as well just ask the question he had been thinking about lately. "How are things between you and Maria these days?"

Philip turned. "I dunno. Okay, I guess. I've recovered from my case of hormonal insanity, if that's what you mean."

"Good. If that means what I think it does. So it wouldn't bother you, if . . . if I wanted to be better friends with Maria?"

"I guess not. It's hardly poaching, after the way she told me off. It was nice of you to ask, though."

"Excellent. Come to my cabin, share a glass of brandy with me."

\* \* \*

Meanwhile, Marshall and Scott had come down, together with Maria, to David's cabin. "Our colony is a new one, I can offer you better hospitality here," David explained.

At dinner, David came to the point. "I understand your last news of England was from this past summer."

Marshall gave Scott a meaningful look.

"I regret to tell you that King Charles has made alliance with the Catholic powers, with France and Spain."

Scott cursed. "I knew it was a mistake for him to marry that Frenchwoman."

"Worse, rather than declare war on the Dutch Republic openly, he and the French betrayed us. The French and English squadrons which sailed with Von Tromp's Sea Beggars, to meet the Spanish fleet at Dunkirk, pounced on him from behind. "

"So England and the Dutch Republic are at war. Are Scott and I prisoners? Hostages?"

"Formally speaking, I am right now in the service of Sweden and the USE," drawled David. "And there has been no attack by England upon either. So while there is no doubt that this alliance is aimed, ultimately, at Sweden, and the USE, I am not *required* to take hostile action against any English ships or settlers I may encounter."

Marshall raised his eyebrows, but said nothing.

"Still, your colony is something of a dagger at the back of mine. As the English fleet was to the Dutch at the Battle of Ostend. And my colonists, many of whom are Dutch, will not be happy to have English neighbors.

"That said, the Governor of Virginia, Sir John Harvey, is a friend of mine. He came to my aid in the days when we were both in the East Indies. So, I would do you a good turn, if I could. If you surrender, and give me your parole, I will transport your people to Tobago, or Saint Kitts, or Providence Island, all of which have English colonies, and land you there under flag of truce." David waited for them to respond.

Scott and Marshall exchanged looks; Marshall gave Scott a slight nod. "You certainly have control of the mouth of the Suriname River," said Scott. "I saw that you have emplaced cannon at your town, and of course you have ships of war, too. You can keep reinforcements and supplies from reaching us, and prevent us from selling our tobacco. And you are too strong for us to conquer.

"On the other hand, you wouldn't find it easy to scour us out. Your colony isn't much larger than ours. We know the terrain better than you do. Your fluyts can't go up our creek, and your yachts don't throw enough weight of metal to successfully assault our fort. We don't need supplies from the outside; we are self-sufficient. The Indians are friendly to us and would come to our aid if you attacked. So it looks like a stalemate to me," Scott concluded.

"Only in the short-term," said David. "Given time, we could bring in troops, land them and march up the creek. And if you huddled in

the fort, we could burn your crops. That would be the end of your self-sufficiency. And I wouldn't be too sure of your Indian alliance. The Indians will switch sides if they think you're likely to lose anyway."

Marshall took a sip of wine. "Have you been to Saint Kitts, Captain De Vries?" That was one of the Lesser Antilles, a crescent-shaped chain of the small Caribbean islands, stretching from Puerto Rico to Trinidad.

"Yes, I put in for water there on my last trip."

"Are you familiar with the peculiar relationship there?"

"Indeed." The island was settled by the English in 1623. But a few years later, they had allowed the French, under the command of the ex-privateer captain Pierre d'Esnambuc, to claim the ends of the island, while the English remained in control of the middle. They held the salt pans in the south in common, and they had agreed that they would not fight each other even if England and France were at war.

"Perhaps . . . perhaps we can do the same? Agree to neutrality between our colonies, regardless of what is happening in Europe?"

"It might not be in my power to conclude an absolute neutrality," David warned. "We didn't know you were here, so we don't have specific instructions from Gustav Adolf."

"But we could at least agree to remain neutral in the absence of a direct order from our Sovereign, and, in the event of such an order, give notice of intent to dissolve our pact."

David looked thoughtful. "It wouldn't be easy for you to receive such an order, considering that we control your line of communication."

"No, it wouldn't. So the agreement will be more to your benefit than ours, but at least would save our honor."

"I will think on it. While it is a tempting prospect—trade, and exchange of information, would be mutually beneficial, I think—the feelings of the Dutch of the colony run high. And we won't always have warships in the river; there would be a fear that you would try to take advantage if they were absent."

Maria moved her chair. The screech drew all eyes to her. "But gentlemen, there is another factor to consider. As a Dutch woman, I was of course appalled by the treacherous attack on our fleet. But I understand that the English in turn are still fired by the incident at Amboyna."

"The massacre—" began Scott, but he desisted when Marshall gripped his shoulder.

"Still, in the long-term, they have a common enemy: the Spanish. The French, too. I think that upon more mature reflection, you will realize that your long-term interests lie with us. Us, meaning, Sweden, and its American and Dutch allies."

Marshall steepled his fingers. "How so?"

"I doubt very much that your king cares what happens to you. Because he has already given up North America to the French."

"The French!"

"Yes, by the Treaty of Ostend, which we learned about shortly after the Battle of Dunkirk. Charles discovered that in the Grantville history books, some of the American colonies revolted successfully, and so he was willing to let them be Richelieu's problem."

"You have proof of this?"

"Sorry, no, but you may question the crew or the colonists," David said.

"You can do better than that," Maria interjected. "Didn't you save the newspapers? You said you would save them until the Spanish had been defeated!"

David swore. "You're right, of course. " He dug them out and handed them to Marshall and Scott.

When they finished reading, he added, "Charles also found out that, according to those history books, he gets into a fight with Parliament, which ends with his head on the chopping block. So he's brought in mercenaries to control London, and he's been arresting anyone who the up-timers' books identified as a Parliamentarian. Indeed, anyone he thinks likely to have such sympathies."

Marshall winced. "Do you know anything of the Earl of Warwick?" Maria shook her head.

"Warwick, Warwick," mused David. "Oh, Robert Rich. Well, what I know about him, is that he is a big investor in New World colonies. Bermuda, and Providence Island, off the coast of Nicaragua. And, yes, Richneck Plantation, on the James, is his. I spent a few weeks in Virginia in March of '33. Why do you ask?"

"He is our chief benefactor," Marshall admitted. "And a Puritan, as are we."

Scott didn't look happy. "He is on the outs with the Court. Opposed the forced loan of 1626. And Laud's repression of the Puritans."

"So what you can expect," said David, "is that either your colony, too, will be turned over to the French, or it will be given as a reward to one of Laud's or Wentworth's cronies."

\* \* \*

Heinrich coughed. "Begging your pardon, Madam Vorst, but the captain wants to see you."

Maria looked wistfully at the half-painted scarlet ibis. She doubted it would hang around waiting for her to finish the captain's business, whatever it was. Answering a gardening question for colonists, perhaps. She knew that she wouldn't have had the opportunity to study the natural world of Suriname if it weren't for the colony, but sometimes her role of "science officer" was irksome.

She rose to her feet, and the sudden movement startled the bird, causing it to take flight. "Help me gather up my things, will you?"

\* \* \*

The captain didn't beat around the bush. "Scott's staying in Gustavus, as the representative of the Marshall's Creek colonists."

Maria raised an eyebrow. "As a hostage, too, I imagine."

David nodded. "Marshall's going back upriver on the *Eikhoorn*, to explain the situation to them and see if they wanted to throw in with us."

"Really. Then perhaps I should go upriver with him. Their fort is on the fringe of the rainforest. I might be able to find rubber trees with their help. Or at least the help of their Indian allies."

"Are you sure? We don't know how they'll react to the news. The crew of the *Eikhoorn* will be outnumbered."

"Captain Marshall seems a man of honor; I will make sure that I am traveling under his protection. And even the Spaniards, when they attack a foreign colony, will usually spare the women."

"You'll be the only woman there."

"I am sure there were Indian women around, they just stayed out of sight on your last visit. And as I said, I will be with Captain Marshall."

David hesitated.

"It's not just that the USE needs the rubber. If I find them a new product to sell to us, that will help reconcile them to the 'Swedish' presence down river. Or whatever you want to call it."

"Okay. You've convinced me."

\* \* \*

"This is *so* slow," said David.

"Slow but sure," Maria replied.

They were watching latex slowly drip from the gash in the tree, into a waiting cup. With the aid of Maria's sketches, themselves based on illustrations in the Grantville encyclopedias, the Indians had been able to locate several different trees of interest. One, the *Hevea guianensis*, produced true rubber. Another was what the encyclopedias called *Manilkara bidentata*. Its latex hardened to form balata. Balata wasn't elastic, but it was a natural plastic, which could be used for electrical insulation.

"Why don't we just chop the tree down and take all its latex at once?"

"Several reasons," said Maria. "They aren't that common, just a few trees an acre, so we would have to go further and further out to find more. If we tap them, each tree will produce rubber for twenty years or more. And finally, it just won't work. The latex is stored in little pockets. It's not like there's a big cavern inside you can chop your way to. If you want a quick return, you need to find a *Castilla elastica*, it has nice long tubes."

"Well, this is too slow for me. It's as exciting as watching paint dry," David declared. "I think it's time for me to head out."

"Back to Gustavus?"

"No, on to Trinidad and Nicaragua. And pick up a Spanish prize or two along the way, if we're lucky."

"If we must," said Maria with a sigh. "But I have such a horrible backlog of plants to study. Lolly told me the rainforest was diverse, and I thought I knew what she meant, but the reality is inconceivable if you don't see it with your own eyes."

"Who said you had to leave?"

"You need me to find the *Castilla* in Nicaragua."

"No, I don't. I have Philip."

Maria opened her mouth, then shut it without saying anything.

"And he has to come with me because he has to go home at the earliest opportunity. Even if he is dreading the parental punishments which await him."

\* \* \*

"Philip."

"Yes, Maria?" He eased the rucksack he was carrying down to the ground. "As you can see, I am packed and ready to go back to sea."

"I am sorry it didn't work out. Couldn't work out. You and me, that is."

Philip didn't quite meet her eyes. "I know. I made an idiot out of myself."

"Don't feel bad. You're a teenage male. Teenage males, by definition, are idiots. Whatever century they were born in."

"Thanks. I think."

"Anyway, I have a present for you." She brought forward the object she had been hiding behind her back. It was one of the blank journal books she used for drawing.

"You can use this to keep track of what you see and do. Perhaps it will make you famous. And . . . and I will enjoy reading it one day."

He took the journal, brushing her fingers as he did so. "Thank you. I mean it. And good luck."

He paused. "Heyndrick seems like an okay guy."

"I think so, too."

\* \* \*

David studied his cousin. "You're determined to stay here in Suriname?"

"Yes. I think there is a lot of opportunity here," said Heyndrick, straight-faced.

"You're blushing."

"I am not," said Heyndrick, coloring still more deeply.

"I am naming you as acting governor, but—you intend to escort Maria on her explorations?"

Heyndrick nodded.

"I thought so. We need someone to keep a steady hand here in your absence. I think I will appoint Carsten Claus as your deputy."

"The ex-sailor? Ran away from the farm as a kid, and later thought better of it?"

"That's right. He is CoC. An organizer of some kind. He is chummy with Andy Yost." Andy was the owner of the Grantville Freedom Arches, the first headquarters of the CoC.

"And you let him come on board?"

"There's CoC money invested in this colony. And the up-timers are counting on the CoC to make sure we don't make any, uh, imprudent investments."

"Buying slaves, you mean?"

"That's right. I will leave you one of the yachts. You and Maria can use it for exploring. You'll have to keep the captain, of course, I don't have good reason to deprive any of them of command. Which one do you want?"

"The *Eikhoorn*."

"I am not surprised." Heyndrick blushed again. The *Eikhoorn* was commanded by Captain Adrienszoon, a man thirty years older than Heyndrick, while the *Hoop* had a young, unmarried skipper.

Heyndrick pulled a map out of its case, and flattened it out. "Are you sure you shouldn't stay until July? See the colony through the end of the first wet season?"

"No. If I wait, I will be in the Caribbean in the hurricane season. Not a wise idea."

Heyndrick found Trinidad on the map, grunted, and rolled the map up again. "That's true . . . However . . . David, I have sailed with you for a long time. And there is something I think needs saying, although I doubt you'd like to hear it."

"Out with it, cuz."

"You want to be a patroon. But we know how often colonies with absentee owners have come to grief. Someone like Jan Bicker can afford a loss, but you can't. You're terrific at managing sailors and settlers and Indians, but you need to manage yourself. After a few months, you go crazy and want to sail off. And next you know it, your colony, your investment, will be gone."

"So what do you suggest?"

"I know you have to, what's the American phrase, 'get the ball rolling' in Trinidad and Nicaragua. And then you want to get the rubber and tar to the Americans as quickly as possible. But after that, please plan on coming back here, and staying as governor. At least for a few years."

"I'll think about it. But it is a waste of my skills as a shiphandler."

"Then perhaps you need to forget about being a patroon, and stick to what you do best."

\* \* \*

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# Radio Killed the Video Star: Mass Communication Development in the 1632 Universe

**Written by Jay Robison**

As we have seen so far in both fiction ("Waves of Change" *Grantville Gazette*, Volume 9) and non-fiction (articles by Rick Boatright and others), the mass media of radio and television are bringing big changes to seventeenth century Europe. In this essay, I will explore the creative and commercial aspects of radio and television, and why I believe that radio will be king in the world of *1632*, at least for the foreseeable future. This essay will not touch on the technical aspects of manufacturing televisions versus radios or expand on the problems of transmission already covered by more knowledgeable writers in previous *Grantville Gazette* issues. Rather, I hope to cover some non-technical reasons why the manufacture of new televisions may be a ways off in Grantville and the shape mass communication policy debate may take in the USE.

## *A Question of Standards*

The first issue that's going to have to be resolved before television can spread will be the broadcasting standard—how many lines of resolution will new television sets be equipped to display? If you've ever wondered why you can't play a DVD or video tape purchased in Europe on your U.S. or Canadian television set (or vice versa), then you've encountered the problem of competing standards. It would be easy to say that new television sets will copy the standard already used in up-time exemplars, and this may well be the case. But this does not mean there won't be a vigorous debate.

Consider how the broadcast standard used in the United States, known as NTSC, came to be. A standard American analog television has a resolution of 525 lines. This was a compromise reached in 1941. In 1936, the Radio Manufacturer's Association (RMA) recommended the U.S. adopt a standard of 441 lines. Perhaps not coincidentally, David Sarnoff, head of RCA, was a major force in the RMA, and RCA's television sets had a 441-line resolution. The NBC television network, owned (surprise!) by RCA, broadcast using the 441 line standard.

Philco, one of RCA's competitors, actually wanted a standard with a far better resolution, between 600 and 800 lines. The agreed-upon standard split the difference. The USE will also have to agree upon a uniform broadcast standard. When television does achieve the kind of market penetration in the USE that it has in many countries uptime, it would never do for a station in, say, Magdeburg to broadcast in a standard that viewers in, for instance, Stockholm will never be able to view. Given that the single operating television station broadcasts in the 525-line NTSC standard, and the existing television sets receive the same, there will no doubt be a lot of people who will push to keep the NTSC standard as new televisions are produced and new television stations come online. But it's by no means set in stone, and if a wealthy and powerful nobleman (or men, or women) back a manufacturer who wants to use a different standard, expect a lively and contentious debate mirroring the VHS versus Betamax wars of the early 80s in our timeline or (for younger readers), the current battle over the next generation of DVD

technology.

Radio doesn't have this problem. Crystal sets either have to be tuned to a single radio station, or have a tuning circuit to receive multiple stations (see Rick Boatright's "Radio, Part 3" and Iver Cooper's "The Sound of Mica" in *Grantville Gazette*, Volume 9 for a more in-depth exploration of the technical aspects involved in making crystal radio sets). With radio there won't be those pesky format issues that television manufacturers will have to face. Not to mention the fact that crystal radios are cheap enough for even the very poor to make (Goodlett and Huff, "Waves of Change")—not something that will ever be true of television sets.

### ***A Question of Production Values***

There's no question as to which medium offers the best bargain for production dollars. It's radio, hands down. Enterprising radio producers able to get anyone with a little woodworking skill will be able to make sound effects equipment, some of which—like the slapstick—will probably already be known to seventeenth century theater-goers.

And radio will offer a great opportunity to aspiring composers and musicians to gain the notice of a large audience. Being the house orchestra or string quartet for a radio theater company may lack the prestige that patronage from a high-ranking nobleman or church official might bring, it might be more lucrative in the long run.

The aspiring radio producer will be able to make do with a smaller performing company than a television producer, especially if they can find talent who can create multiple voices for multiple characters. If you're very fortunate and find a talent comparable to Mel Blanc, the voice of every Looney Tunes character, Harry Shearer, who voices about a dozen characters on *The Simpsons*, or even Peter Sellers, who starred in *The Goon Show* on radio before crossing over to film, you practically have an entire cast in just one performer! Even a talent like Peter Sellers couldn't carry an entire television show or movie by himself, though at times he came close.

For the time being, television will do well with live or taped performances of plays, something that started not long after the Ring of Fire, with high school performances of Shakespeare's plays providing some of the earliest WVOA programming (1632). Television addresses by important leaders like Frank Jackson ("Breaking News," *Grantville Gazette*, Volume 5) and Emperor Gustavus ("Mightier Than the Sword," *Grantville Gazette*, Volume 6) will certainly be inspirational to those who can see them, and pictures will add an extra dimension to instructional programming that radio won't be able to match. Still, there's no question that radio will provide the better bargain.

### ***A Question of Editing***

Another problem television in the 1632 universe will face is editing pre-recorded content. Equipment probably won't be much of a problem. We know there's at least one digital video camera in Grantville, and there are probably a number of analog camcorders floating around as well. But it's less likely that the type of recording equipment generally used even for amateur video productions would be available. Items such as a portable digital audiotape (DAT) recorder with a boom microphone, or similar equipment would probably not have been in Grantville, except by extremely wild coincidence. The built-in mikes on video cameras will not capture sound nearly so well, though they'd probably be serviceable for "talking head" type programs, and if shooting on location outdoors there will be no way to block out unwanted noise.

Editing pre-recorded material on tape will be a challenge for both media, but much more so for

television than radio. To talk about editing, we have to talk about "linear" versus "non-linear" editing systems.

Editing analog sound or video requires what's known as linear editing. Basically, you have to edit in the order you record. For sound, this is done with tape on a reel-to-reel system. Editors have to physically splice tape together. Videotape used to be edited the same way, until the advent of "helical scan" videotape, which is what the VHS machine in your home uses.

To edit the videotapes made by analog camcorders in Grantville, one would need an editing rig consisting of two tape decks, a monitor, and a keyboard for editing functions. Though much of the video industry has switched to non-linear editing systems, linear editing is still commonly used in editing news. Given the realities of school budgets, it is almost certain that Grantville's high school television studio has at least one analog video editing machine. It is probable, however, that if there are only one—or maybe two—linear editing machines at WVOA that they will be in much demand for station and student use, and a long line for anyone else wanting to use them.

An independent producer with access to the right manuals or a knowledgeable individual willing to experiment will be able to assemble a crude but workable linear video editing system by using two VCRs, two televisions, and a stopwatch to make sure everything is synchronized. An expensive proposition in down-time Grantville, given the finite quantities of all of these components.

Non-linear editing, for both audio and video, is the style of editing used in digital systems. As the term "non-linear" implies, it is possible to edit in any order, not necessarily the order you recorded something. If you've ever used a desktop video editing program like iMovie, FinalCut, or Adobe Premiere, you've taken advantage of non-linear editing. Again, there is at least one non-linear editing system in Grantville, owned by Jabe McDougal. iMovie and FinalCut, two of the more common non-linear programs available to the general public, were only introduced in 1999, just prior to the Ring of Fire; Adobe Premiere was introduced in 1992 but probably wouldn't have been widely used, given that it retails for over \$800. FinalCut Express costs about half that, but it and iMovie, which came bundled on Apple iMac computers starting in 1999, would probably also not be terribly common in Grantville given Apple Computers approximately 5% share of the home computer market at the time of the Ring of Fire. Once again, radio will have an advantage. Non-linear editing programs for sound have been around and available to consumers years longer than video editing programs. By the time of the Ring of Fire, sound editing programs will be available for both Windows and Macintosh operating systems at low cost—under \$100. Certainly there will be less of a "bottleneck" when it comes to audio production at the high school than with video. And it's far more likely that other up-time citizens could have a sound-editing program on their computer, especially if they have an interest in music composition and/or production. Pre-recording radio series will be much easier than a video production.

### ***A Question of Models***

The next question will be, what shape will the business of radio and television broadcasting take down-time? Who will own the broadcast spectrum in the United States of Europe? Will new radio and television stations be government-owned or will they be private businesses? And who will pay for programming?

According to established canon in the *1632* story universe, there are two broadcast radio stations in the USE: The Voice of America, which was brought online soon after the Ring of Fire, and the Voice of Luther. A radio station run by the Jesuits, Loyola of the North, is on the horizon. More stations will

certainly follow as vacuum tubes begin to be manufactured in the late 1630s, allowing for an electronics industry.

The first essential matter, as building radio stations becomes more commercially viable, will be allocation of the analog broadcast spectrum. The first question which must be settled is: who owns the airwaves?

As Grantville came from the up-time United States, it's useful to know what up-timer expectations might be. In the U.S., the broadcast spectrum, analog and digital, is owned by the people of the United States. The Federal Communications Commission exercises authority over who and what is broadcast over the American airwaves and divides up the broadcast spectrum so that devices such as cell phones don't interfere with radio and television broadcasts and broadcasters don't step on each others' signals. The United States government is not permitted prior censorship over material broadcast on the public's airwaves, but may impose fines for "indecent" material after the fact, something that has led to continuous controversy OTL, since standards are arbitrary, and the line between what constitutes self-imposed standards by broadcasters and what constitutes government coercion is a fine line indeed.

Knowledgeable up-timers will also be aware of alternative models for government regulation of television and radio broadcasting, particularly the British model. The British Broadcasting Corporation (BBC) was established in 1922 as a quasi-government corporation, with strict boundaries over how the government could regulate content. The first private television channel didn't appear in Great Britain until ITV went on the air in 1955, and was joined by Channel Four in 1982 and the station known as Five in 1997, the latter two stations coming after deregulation of broadcasting in Britain in the 1980s. The BBC currently runs nine radio stations, in addition to its three television stations.

I expect a lively debate in the USE over laws regulating the licensing of new broadcasters. But how will nobility view the broadcast spectrum? Will they see it as something like mineral rights, which they control and dole out? Will Emperor Gustavus assert that *he* owns the spectrum? Given the headaches that printing presses were causing the powers-that-be in Europe even before Grantville's arrival, it's a cinch that nobles will like radio and televisions even less and try even harder to control it. John George of Saxony is already trying to jam VOA and VOL broadcasts in his territory (see "Little Jammer Boy," *Grantville Gazette*, Volume 9). It seems likely that the nobility will want noble or royal control of the spectrum as a way of controlling what is broadcast. If they own the spectrum, they can make sure only the "right" people get broadcasting licenses. It also seems likely that the USE House of Lords will be much less concerned with maintaining strict boundaries against prior censorship than the governments of the up-time United States or United Kingdom.

It's highly unlikely that this will be acceptable to many up-timers and newly empowered elements like the Committees of Correspondence. Since up-timers and the CoC will be a minority, albeit a vocal one, they will have to try to convince sympathetic nobles and commoners that it is in their best interest to have ownership of the USE's airwaves in the hands of the public with minimal censorship. Anything could happen, though Britain's mix of government-owned and independent broadcasters would seem a logical compromise.

As far as who pays for programming on WVOA-TV, and the VOA and VOL radio stations, there is no reason to think we won't see an extension of the good old-fashioned arts patronage that is the accepted system in the seventeenth century. Broadcast media, especially radio, will offer excellent opportunities to people that may not have been able to afford to found or fund a theater company otherwise, and with

the potential for far greater exposure. Up to 500,000 people live within the Voice of America's broadcast area, and even if only 1% of that population had access to a radio, the audience would still be far larger than a theater of the time could hold (According to Wikipedia, Shakespeare's Globe Theater had a maximum capacity of about 3500 spectators).

As a vehicle for a business, broadcast radio and television are even better. In the United States, there is a long history of single-sponsor programming. Think of the famous anthology series, *The U.S. Steel Hour*, or Edward R. Murrow's interview show, *Person to Person*, sponsored by Alcoa. Radio listeners and television viewers will have to get used to intermissions in plays or musical performances being interrupted by the glories of Dr. Phil's latest miracle products, the latest editorial from the Committees of Correspondence, or the ten reasons why Rheinlander Silk is better than any other silk for industrial uses. As we've already seen, the VOA runs a mix of instructional and entertainment programming, which I imagine will continue to be the case until more stations come online.

### ***Conclusions***

For the medium term, radio will be the king of broadcast media in the USE. As for the rest, only time will tell, but there's no reason to think there won't be some very public fights over who controls the airwaves and what gets broadcast on them. Down-timers are already recognize that knowledge is power, and radio especially has the potential to reach people even broadsides cannot, and the ruling authorities will not be eager to allow it to spread unchecked.

### ***Sources***

Most of the information in this essay was gleaned from Wikipedia and from the United States Federal Communication Commission's website, [www.fcc.gov](http://www.fcc.gov).

For more about debates over content in U.S. television, *See No Evil: The Backstage Battle over Sex and Violence on Television*; Simon and Schuster, New York, 1979.

The movie *Goodnight. . .and Good Luck* offers, among other things, a glimpse at how television worked in the 1950s, and Harlan Ellison's short story "Jeffty Is Five" is an excellent salute to the Golden Age of Radio.

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# Metallic Fusion: Putting it Together in 1632

Written by Kevin H. Evans

The construction of machines and devices requires that sections of material be attached to each other. This can be accomplished by friction, adhesives, mechanical connections, and welding.

Down-time fastening methods were mostly mechanical. That is the methods depended on adhesion (stuff sticking together) created by means of a device compressing the parts together. Screws, rivets, nuts and bolts, trunnels (tree nails), pegs, lashings, glues, and gravity were all used to hold stuff together. All of the fastening methods described are composed of layers, and so have some inherent weaknesses. While suitable for most construction, the methods described do not provide the strength needed for many things our up-timers want to make.



Of all of the fastening methods described, rivets and glues come closest to being able to provide the strength to weight connections needed.

Rivets involve making a hole through the two (or more) parts to be joined and putting a pin through the holes. Then the ends of the pin are hammered down to form a mushroom shaped head on each side of the parts. This compresses the parts together and holds them firmly in place. Well done riveting can make seams that will hold pressure (as in a boiler), or stand up to great stress. Rivets have problems where the demands of the connection do not allow room for the mechanical process of riveting or space for the rivet heads in the finished application. Countersunk rivets (cone shaped depressions in the plates to be riveted) allow rivets that are flush to the surface, but reduce the strength of the joint, thus increasing the number of rivets in the seam or requiring the increase in thickness of the parts.

Glues can form very strong joints, but require that the material glued be porous. Often this limits the utility of the method. Soldering and brazing are a form of gluing, and were known before the ROF, but due to limitations in heating methods were used mostly in smaller applications. Brazing and soldering also need pores in the material connected and can shear under stress or heat.

Welding is the connection of two parts by actually mixing the metal of the two parts so that they form one continuous piece. Welding is also normally done to ferric (iron based) metals. Non ferrous welding is possible but requires care due to the tendency of the metals to oxidize before the parts can be joined in to one piece. Welding also allows the rapid fabrication of devices in a fraction of the time needed to make the devices by other methods.

Welding can be accomplished in a number of ways. Down-time welding was most often forge or percussion welding. This weld is made by heating the two pieces until they are soft and plastic, placing flux on them, putting them one on the other and applying force, hammer blows or pressure, causing the metal to fuse in to one piece. This is also called hammer welding and can be done manually or by a forging machine like a drop hammer. The flux is usually sand or borax and serves to exclude oxygen and oxides from the join. Hammer welding is most effective with low carbon steels and iron. High carbon steel requires much higher temperatures and this makes the exclusion of oxides harder. Hammer welding is a skill well known by the smithing community of the 1600s and even high carbon steels are within the ability of a master smith. The greatest limitation of hammer welding is the amount of heat that needs to be applied. Normally the heating time possible with a forge fire means that larger pieces have to be heated over larger areas than are required for just the weld. This slow heating increases the fuel consumed and also increases the difficulty in handling the work.

New to the down-time world are gas, electrical, and chemical welding. Gas welding is accomplished with a torch burning a fuel and an oxidizer, normally acetylene and oxygen. The torch is used to apply heat directly to the point to be welded and cause the material to liquefy and flow together. Often a rod of the same metal is used to control the heat and provide additional material for joining the gap between the two pieces to be fused. Gas welding markedly decreases the amount of time needed to heat a joint to welding temperature. Also a weld created with the gas method does not need percussion applied to fuse the metals. However welds heated by a gas torch can run in to the same problem, heat traveling, and requiring the heat of large areas before welding heat is available to the join in large pieces.

While at first glance a new gas welding set would seem to be outside of the industrial base available down-time, careful consideration brings to light workarounds that will allow the technology to spread. Hoses can be made from leather tubes wrapped in latex-impregnated cloth with an outside leather case protecting the cloth. The latex is locally available as milkweed sap or dandelion sap and while it is not as pure as rubber tree sap, it was used during WWII as a substitute until the synthetic rubber industry came on line. Gas regulating valves also looked very difficult, but I "bit the bullet" and tore one of my old regulator sets down to see how they were made. To my surprise they are not complicated, and the hardest parts to make will be a large spring that holds the diaphragm against the valve that controls the pressure released from the storage device, the valve bodies are made of brass and the spring and diaphragm can both be made by any smith that can make a knife that will hold an edge. Storage is a little harder as down-time produced tanks are likely to be more cumbersome, probably riveted and seal welded on the seams. All in all, a down-time set will be larger, not as long lasting, but will be possible. That leaves the gas. Welding gasses, normally acetylene and oxygen, need to be produced in quantity. Both will need electric current, oxygen produced by electrolysis, and the acetylene produced by adding

water to calcium carbide. The calcium carbide is also produced by applying an electric arc to coke (refined coal not the drink) and limestone. While not deliberately canon, production of calcium carbide is implied in the operation of the mines in Grantville as "carbide lamps" were the industry standard prior to long duration batteries, and I am sure that as the high tech bulbs burn out, that old lamp of dad or grandpa's will come out of storage.

Electric welding uses a high current electric spark to create the heat needed to fuse the metal and form the joint. Of note, is that the electrode is normally sacrificial and is used to add metal to the joint created. This current may be AC or DC and can be provided by batteries or by a generator set. Variations on "stick" welding include wire-fed inert gas shielded welding where the electrode is a wire fed through the welding handle and is shielded from oxidization by an inert gas fed to the weld site from a tank connected to the "stinger". Also of note, is that electric welding is an immediate heat in a small area and can be used to weld large sections of material with minimal heat.

The major problems with electrical welding are the need for insulating the cables used and providing flux on the electrodes (welding rods). Lastly because electrical welding heats such a limited area, crystallization of the metal can occur. This can be avoided by experience on the part of the person welding and by annealing the joins made.

Other forms of electrical welding include Spot welding and Roller Seam welding. Spot welders are normally stationary machines with two electrodes mounted on parallel arms the material to be welded is placed between the electrodes and high current is passed through the material via the electrodes causing the metal to melt into each other. As a welding method it is really fast, and lends it's self to sheet metal fabrication especially well. Roller Seam welders are a variation of the spot welder where the material to be welded is placed between roller tipped electrodes and moved so as to continuously weld a seam. A variation of the roller seam welder has the rollers on each side of a seam in a pipe or tube as it comes out of the rolling mill to make sealed seam pipe.

Of all the methods, electrical is probably the easiest to make from scratch. Large batteries can provide the Amperage needed to strike an arc and weld. The electrodes can be made from drawn wire. Flux can be applied at the work site by dipping the rod in a bucket of borax and allowing it to dry. The biggest problem will be insulating the cables and clamp that holds the electrode. After that will be charging the batteries. Insulation is probably possible using dry linen and latex or wax, wrapped in dry leather. The clamps can be fabricated with ceramic handles containing the cable and clamp. Good welds can be made with as little as fifty amperes, or about the capacity of an automotive battery. Heavier joins on large metal will need more amperage. Lead acid batteries can be made with 1600s technology. Glass cases and bronze supports for the plates with sulfuric acid are sufficient to the work. Note that thick glass is harder to break and makes a safer battery. Chargers can be operated by a water wheel or small engine. The system will be bulky, and awkward to use, but will weld like a charm.

Thermite welding is perhaps one of the least known and potentially most useful forms of joining metals. The process is achieved by making a mix of aluminum and iron oxide powder. This mix, oddly enough called thermite, is placed in a container above the metals to be joined, and ignited. Use black powder or potassium permanganate and glycerin. The aluminum during the reaction pulls the oxygen from the iron oxide leaving the iron to flow in to the mold around the pieces to be joined. The mix can be "salted" with a number of ingredients to provide the exact grade of steel or iron desired. This was the preferred way to repair large items. These could anything very large like a broken locomotive frame. It can be thermite

welded and be restored to full function.

The greatest problem is the powdered aluminum supply, as a limited amount will be available right after the ROF. It is possible to rework the aluminum oxide to aluminum with electricity and heat processing. Personal protection is another consideration. All welding demands some form of vision protection. Hammer welding is the least damaging to sight and electrical welding is the most damaging. Face-covering helmets with smoked or tinted glass windows are used to protect from spatter and intense light. Leathers are used to protect the body and arms, while gloves are used to protect the hands. Gas welds can often be made with tinted goggles only, and provide sufficient protection for the eyes.

Now we come to the Grantville connection. Who in town knows how to weld? How many sets of welders are sitting around? What does Grantville do when the up-time supplies run out? I have never lived in Mannington, and so am falling back on the town my mother is from. It is a small community in Idaho of some 1800 inhabitants, it has a grain elevator on the UP main line, a small downtown area, a garage, a used car dealership and a Co-Op. Most of the local farmers come in to town to shop and resupply as needed, forming most of the economy of the region. Welding is considered a skill essential to the rural life style. Almost every male in town (and most of the ladies too) over the age of twelve can at least stick stuff together. Complex jobs tend to get passed off to a friend who has a better hand.

In Grantville the "good hands" are relatively common, at least four or more at the mine, about the same at the power plant, one or two at each machine shop, and the instructors at the Vo-Tec. Of note is that the Vo-Tec has a comprehensive instruction string set up and should be able to pass on welding knowledge with no major problems. The majority of households have an arc welding set with a mask and a box of rods in the old fridge in the garage. Gas sets are a little less common with one household in three having one. Before the ROF, when tanks had to be filled, one would need a trip to the "City".

Most of the sets are of home quality (think *Harbor Freight*, or cheap-stuff-from-china grade). Industrial grade sets are more limited, with appropriate businesses having one or two sets of each, and the high school having three or four sets for instruction. This adds up to around 200 to 250 arc sets and maybe seventy-five gas setups of secondary quality, leaving fifteen to twenty sets of industrial grade equipment in town. Grantville has a power plant, a mine, and three or four machine shops, so add maybe twenty-five more industrial sets giving forty-five to fifty sets of the good stuff (arc and Gas) and a whole lot of lighter weight stuff sitting around.

Welding supplies will take a dive after six months to a year, even if there is a welding supply house in town, and arc welders will be down to hand-drawn rod coated with glued-on sand or borax. Specialty rod (like stainless steel rod and High carbon) will be hoarded. Gas will run out in a year or so and will be unusable until the calcium carbide works are in operation, and some one is producing oxygen, either by electric means or by pressure distillation. If I had to predict it, I would imagine that initially gas will be produced by generators on site, for acetylene, and by large low pressure cylinders, for oxygen. As the steel industry develops, forged steel high pressure tanks will become available for oxygen storage, and acetone will be available to provide higher concentrations (pressures) of acetylene. The acetone is needed as acetylene compressed to more than 15 psi will self ignite in the same way that diesel ignites under compression.

In summary, welding is available for Grantville in the short term, (twelve to sixteen months) and still possible after that time as supplies become more and more common. Dissemination of welding knowledge will happen as fast as the down-time community becomes aware of it. Just the knowledge of

the possibility will cause the rapid development of the technology outside of the local Grantville area.

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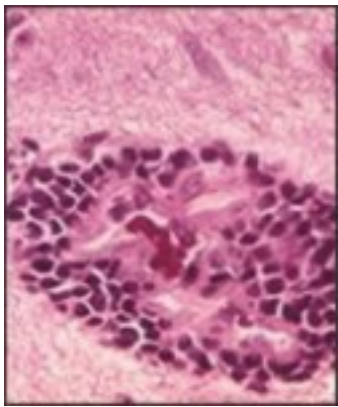


# Second Hand Help

**Written by Vincent W. Coljee**

In *Grantville Gazette*, Volume 10, vaccinations in the 1632 universe were discussed as something Grantville would introduce to early modern Europe and beyond. Vaccinations are an extremely useful and beneficial healthcare innovation both from the societal and personal perspective. Widespread use of vaccinations can prevent many different diseases which were the major killers in the early modern era and kept life expectancy down. However, they have one major inadequacy: they do not work once you are infected (the exception being rabies which can be vaccinated against after infection but before the onset of clinical symptoms).

In our current modern era, we have found various means by which we counter disease even after infection. Bacterial diseases can be cured by use of antibiotics. Many viral diseases can be contained by various antiviral medications and most parasites have become so rare in the developed nations that people no longer know what they are like. Many of the diseases caused by parasites have effective remedies. With artemesium derived drugs against malaria, organo-arsenic drugs against trypanosomes (which cause sleeping sickness in Africa or Chagas disease in South America), parasites have mostly become a matter of inconvenience in the Western world, such as head lice in school age children, rather than life threatening. All in all, aside from cases of the sniffles, infectious disease has become relatively uncommon in the developed world. Even though many doctors are justifiably concerned about the emergence of multi-drug resistant bacteria, infections of all kinds are not the major killers they used to be because they are so effectively controlled by modern sanitation, inspection of the food supply and effective drugs.



In our history, we have more extensively used something else to fight disease which just about everyone still recognizes by the word or action, but many of us do not know the origin of the concept. These are anti-toxins, anti-venoms and antidotes. Here, I would like to discuss and propose that together with making vaccines, introducing improved sanitation and making people familiar with the germ theory, the use of anti-toxins and antidotes would also be a vital tool in the battle against disease.

## ***What precisely are antidotes?***

An antidote or anti-toxin can be defined as any substance which can counteract a toxin. A toxin is a substance which causes bodily harm usually through poisoning. To differentiate a toxin from a simple

poison, it is said that even though toxins come in a very wide variety of different molecules, they are often proteins and produced by living (micro) organisms. Likewise, antidotes are often antibodies which bind and neutralize toxins. The easy way to envision the action of an antidote is to think of different locks and keys. For the body to work correctly, different locks and keys (proteins called enzymes which do anything and everything from help you create usable energy in your cells to making new building blocks for your proteins or DNA) have to work perfectly together. If a toxin interferes with a specific key being able to fit in a lock, that process is disrupted. If this process is something essential, the toxin can be deadly. An antidote can work in different ways but usually it binds to the toxin and prevents it from interfering with the lock and key in question. Toxins we have commonly heard of are Tetanus, Botulinum and Diphtheria. Although Botulinum toxin is the most deadly toxin known to man, it is currently more associated with the temporary removal of wrinkles than with death.

### ***Why should Grantville bother making these antidotes?***

These days everyone in the Western world and even most of the developing world gets immunized against tetanus and diphtheria. What we are actually immunized with are the tetanus and diphtheria toxoids, the inactivated forms of the toxins that are produced by the tetanus and diphtheria bacteria. In addition, when we go into the hospital for a tetanus shot when we have scratched ourselves on a dirty nail and we haven't had a shot for a decade or longer, the tetanus shot may come with some tetanus immunoglobulin, a concentrated antidote, in addition to the tetanus toxoid. Without these vaccinations, diphtheria and tetanus would manifest themselves widely as the very deadly diseases they are.

The development of the first antidotes against these toxins during the 1880's was one of the first steps in modern medicine, together with smallpox vaccinations, that made a major impact on the childhood mortality rate. I believe this technique will be favored by the up-time medical staff because they could make such a large difference and most of all because they can be used and still be successful after someone is already infected.

### ***What are antibodies and how are they produced?***

Antibodies are the end product of one of the two major branches of vertebrate immune systems. These two are called the cellular and the humoral branches. I will not be discussing the cellular branch, aside to say that it provides for a massive amount of professional literature and still keeps a lot of research scientists quite busy. The humoral branch is so-called because the end product can be found in the humor "blood" and these are antibodies. They are proteins which evolve so that they can bind very many different kinds of molecules. The manner in which they are developed in the body is reminiscent of the theory of evolution. A type of cell called a "naïve B-cell" is stimulated to differentiate, i.e. to start to develop down the pathway to become an antibody-producing cell called a plasma cell. During this process, the cell is presented with an antigen, a sample of what the antibody is going to be binding to, the B-cell divides and of the offspring only those making an antibody with some capacity to bind to the antigen survive. Those cells that fail to make binding antibodies commit suicide. This process is repeated at least three times with increasingly higher hurdles for the binding. In the end, it results in a specialized cell producing lots of an antibody with strong binding to the antigen. This whole evolution can take as long as three weeks. The process in itself, of course, is much more intricate involving many different changes in the cells and requires interaction with other cells and their protein products which can stimulate or break off this process, called differentiation, from a naïve B-cell to a plasma cell. Once a plasma cell has been produced, it will now continue to pump out antibodies. These cells are

terminally differentiated, which is to say they no longer divide and they no longer develop any further. They do, however, have a tendency to settle down in the bone marrow where some of them continue to pump out antibodies for sixty to a hundred or so years. Not all plasma cells are that long-lived, some survive for merely a few weeks, others months or years. That is why vaccinations for tetanus are repeated every 10 years but you only need two shots of measles vaccine. If you actually have a disease, you tend to have a very long lived memory of that particular form of the disease in the form of long surviving plasma cells churning out antibodies all day every day. This immunological memory is much enhanced by some of the progenitors of the plasma cells in the B-cell differentiation process called memory B-cells. In the process of producing the plasma cells, the intermediates have a step where the cells can already bind fairly well to an antigen, however these cells retain the capacity to divide and enhance their capacity to bind to the antigen. These memory B-cells also stick around, favored hangouts for them can be found in the spleen, tonsils as well as the appendix and other locations around the intestines. If you come across a particular pathogen again, after you are vaccinated or have had the disease, these memory B-cells can rapidly multiply and develop to become many more plasma cells that can produce an overwhelming quantity of antibodies to corral the disease in a much shorter period of time, a mere matter of days a compared to the few weeks it takes to develop immunological memory the first time. Since most diseases require more time than that to gain a foothold and to spread, the system works extremely well to contain diseases the individual already has encountered before or been vaccinated against.

### ***How can antibodies be induced against a specific disease?***

Vertebrates have evolved in an environment which is rich in bacteria and viruses as well as opportunistic parasites. Since these are so much smaller and simpler, these organisms have an advantage in that they replicate much faster. Vertebrates therefore cannot just accept getting infected without having mechanisms to cope with preventing these microorganisms from using our bodies as a food source. Many bacteria and viruses have co-evolved and instead of being harmful to us they can be beneficial. For example, much of our DNA consists of sequences which were introduced by viruses over many millions of years. We have yet to discover whether many of these sequences have any particular function, but for some of these we have identified specific beneficial and/or detrimental effects. Similarly, bacteria, which do not hop a ride on our DNA, have also evolved to become co-dependent. We have bacteria living on our skin, in our gut and all our body cavities. Most of these resident bacteria try to make certain that bacteria that can cause us harm do not obtain a foothold. Some of these bacteria produce nutrients from food we cannot digest, some produce vitamins, some actively suppress harmful bacteria and some function as friendly sparring partners for our immune systems to learn from. Bacteria have several features which the vertebrate immune system is particularly alert to. When bacteria enter the body, they often find it a very hostile environment, and they tend to break up frequently. This then spills their cellular contents which among other things contains the bacterial DNA. This DNA is something that a percentage of antibodies are naturally made against, and humans commonly make these kinds of antibodies with a high affinity to DNA. This is one of the reasons why we can have an inflammation reaction when we get a bruise. The cellular damage to ourselves, even when not exposed to outside microorganisms does cause the spillage of our own cells cellular contents among which is DNA. This DNA is then recognized by our antibodies which then help to recruit the rest of the immune system to come in and clean up the mess. This can cause the area to be inflamed, even though it is not infected. That is why it is beneficial to ice the bruise and perhaps take aspirin to reduce

the inflammation so that the immune system doesn't go haywire and try to clean up more than just the damaged cells. Another common feature recognized by antibodies are the cell walls of bacteria, which frequently have a large amount of specific carbohydrates, different kinds of sugar-like molecules. These are relatively specific per bacterial species, but as molecules in general, they provoke a very strong immune response. Again, the human immune system naturally makes antibodies which bind these carbohydrates. Both the DNA and the carbohydrates can be injected in isolation and cause a very strong inflammation response. This is important since it attracts the immune system to a location with a big sign of "here is an invader." Substances which proverbially carry these signposts are called adjuvants and are used with most kinds of vaccines to enhance the response against a particular antigen.

Thus, the two ways in which we can build up immunity against a disease are either having the disease and surviving or being vaccinated. For many diseases we don't have an option, we just don't know much about them or there is too much diversity in the disease. The common cold is a good example of a disease with large diversity. As there are so many different kinds of viruses that cause the common cold, having had one doesn't protect you against the next. Similarly, malaria can be very different from one round of infection to the next. Although for this disease, if people are infected enough and survive they do build up a substantial degree of immunity, however, trying to get to that point is deadly for over 1 million children a year in the developing world.

### ***Historical uses and production of immunoglobulins.***

Going back to the early modern age where Grantville landed and the medical establishment of the time, we come across a particular mindset. Disease was perceived to be caused by an imbalance of humors, the bodily fluids. It could be onset by bad odors, but the disease in itself was thought to be an imbalance. The manner in which they attempted to re-establish these imbalances was by drawing out the various humors in many different ways, blood letting being a particular favorite. Strangely enough, some patients actually did get better after treatment. While most of this can be attributed to natural resilience in the human animal, sometimes drawing blood or making someone vomit can be the medically correct course of action. All this blood letting left a solid impression on western medical science and is not entirely without merit. Much about the health status of an individual can be discovered from examining their blood, at least we are able to do so in this modern day and age. Since the blood serves as the supplier of materials to the body, so it serves as the sewer by which waste from the various organs is brought back to be disposed of, usually by either the liver or the kidneys. By the time Pasteur and co-workers discovered that one can vaccinate animals and people by injection of dead or weakened micro-organisms, the fight was on to see which micro-organism caused which disease. A leader in this effort was a German by the name of Koch. In his laboratory, many people worked in the identification of these organisms. Diphtheria, tetanus, cholera and tuberculosis (TB) bacteria were a few that they identified. As a next step, Koch and collaborators infected animals with these organisms to create animals which had immunity to these diseases. This would be followed by periodic draining of some of their blood. This blood would contain antibodies against the disease in question. This worked very well for making antitoxins against several diseases, especially against the tetanus and diphtheria toxins. However, it also failed miserably in some instances, such as TB. Koch declared that he was able to make an antidote against TB, but was unsuccessful, resulting in the general and medical population doubting his theories and harming the development of future useful antidotes being available. The other large drawback from these antidotes was that it required injecting humans with blood derived products from animals. Some antidotes were made from human donors but those were not always available and almost never in

sufficient quantities.

The disadvantage of using plasma or antisera from animals in humans is that although we are related to these animals, and the immune systems in animals such as horses, sheep and goats work in a very similar manner, the antibodies the animals produce are not exactly the same as ours. Immune systems can be quick to identify something as non-self, and when it does so, it starts to make antibodies against it. And so it is with these animal-derived antidotes. The use of these antidotes generally worked very well in a first and perhaps a second application, but after that, the person in question would develop immunity against the cure, which could lead to life threatening side reactions. Antisera derived from other humans lack the capacity to induce such a response, so are much preferred. However, finding the right donors is difficult, and since this is a blood-derived product, the danger was and is always in the possibility that the donor can be infected with another disease that could be carried over. There are times when the danger of infecting someone from a transfusion or an immunoglobulin injection is minimal compared to the danger of dying of the disease. Grantville is very much present in a time where the choice to use an antisera would save many more people than the remote danger of losing them to an unknown infection.



Diphtheria is an excellent example. Adults who have had the disease are safe and generally won't get ill again if exposed to it, whilst children are very vulnerable. In the early modern era, it was a major childhood disease, often hitting communities every five years or less and killing about 30-40% of children it infected. Since this is a very distinctive disease, with very memorable symptoms, people would often know if they have had or currently have the disease. Should there be an outbreak in the community, there would be a rapid source of donors for immune serum. In a household where a young child may get sick, there would likely be their parents and perhaps older siblings who have previously survived the disease. By taking serum from these re-exposed individuals, there are likely to be very high levels of anti-diphtheria antibodies present in their blood. True, they may not have gotten ill themselves or perhaps had very mild symptoms, but they will have still been strongly exposed to the bacterium and their immune systems will have geared up their memory B-cells and made many new plasma cells all pumping out loads of antibodies against diphtheria. Now it becomes a question of how to get these good antibodies from these immune people to those who really need it, namely those who are trying to fight the disease the first time.

### ***How can Grantville go ahead and use antidotes?***

At first glance, starting to use antidotes is a no-brainer for Grantville. It works, people get cured and the concept is pretty simple. Where it gets difficult is the usual place, the devil is in the details. If we look at the things which are required to make antidotes from scratch, just having the right available donors is one thing and in the middle of an epidemic the best, but the tools to transfer the antibodies to those who

really need it is quite another problem.

One example of the difficulties is, in order to get at the antidote, you need to get access the blood. Now, in the early modern era, one would say this is not much of a difficulty, just cut someone and let them drip. The early modern doctors were very good at exsanguinating patients, to the point of having bled them white while still keeping them alive (albeit just barely). So that problem is easily solved. But doing this in a manner where the blood was captured in as sterile a way as possible was not something they knew how to do. To do so with a high degree of success, one has to use a needle, tubing and a sterile collection container, be it a tube, bag or flask. The only people with training to do that in Grantville, would be the doctors, nurses and their retired compatriots, the vet and perhaps some of the EMTs. This is only a handful of people. Luckily, training someone to draw blood is not very difficult. Given a couple of days and a reasonable knowledge of the veins in the arms, just about anyone who doesn't faint at the sight of blood and has a steady hand can learn to draw blood.

The next hurdle is finding a needle. For anyone who has had blood drawn in the hospital recently, it is not a big deal. You go in, most times a nice person puts in the needle with a minimum of pain and effort and a tube or two are drawn and before you know it you are pressing a piece of gauze on the site. Having a closer look, you may notice that the needle (usually a so-called butterfly needle these days) disappears into a red container with big warning labels on it. These red containers collect the sharp items which are contaminated with human body fluids. These get collected and incinerated regularly. That also means that the beautifully shaped butterfly needle was a single use item. Grantville doesn't have that luxury. Prior to single use needles, there were needles which were used time and time again, beautifully precise instruments made of flexible steel and "needle" sharp. In order to keep that needle sharp, it would need to be sharpened after every two or three stabs. That means a nice butterfly needle, even if it gets reused, would wear away after about 100 uses. The type of steel used in a hypodermic needle is special. It is very soft and very malleable, so it doesn't keep an edge long. It is also susceptible to rusting. As it happens, blood is a very good catalyst for making steel rust. Having even a very tiny bit of rust flake off while injecting someone can cause a nasty reaction. If that bit of rust were to travel in the blood to the heart, lungs or brain and get stuck in a capillary, it could even cause a fatal heart attack, embolism or stroke.

Grantville is stuck with a limited number of needles until they can make the correct kind of steel specifically required. This also limits how many people get to learn to draw blood properly. Are there any alternatives to steel needles? There are some plants which produce hollow needles which are surprisingly sharp. Some bird bones are small enough and hollow to function and can be sharpened. One of these could be found of possible use, but the danger of leaving a small fragment of broken needle made of plant fibers or bird bone in a vein makes me hesitate to suggest this line of development. Other alternatives may be the use of more malleable metals. Bronze comes to mind, although here the danger may be copper toxicity. This alloy tarnishes readily and would only be useful for a very limited time. In aggregate, it means Grantville will need to make use of the needles it has. It would mean reusing the needles they have. The combination of the GP's, the retirement home and the vet's practice would yield a supply of needles that would need to last until they can make new ones. Most of these needles would be for injections and not bloodletting though. The difference is mostly in the size of the needle. To draw blood, you would like a fairly wide needle so that blood can flow easily through it. If you make the needle too thin, the blood ends up being sheared while it is drawn. This leads to broken red blood cells and makes the serum unusable. To reuse one of the suitably wide needles, it would have to be cleaned,

sterilized and then "baked" dry. In the case of most butterfly needles, the tubing is attached and cannot be readily detached. That means that the tubing would have to survive this process as well or has to be discarded and new tubing has to be attached before each draw. That leads to needing reusable or easily replaceable tubing. Tubing these days is mostly plastic which replaced the rubber derived tubing used in the earlier parts of the twentieth century. Making plastic tubing would require a long process of which a petrochemist will have a field day explaining; starting with crude oil, there are quite a few steps to get to nice sterile tubing. That means Grantville again has to work with what it has available and find ways to reuse as much as it can.

All right, say we have used the precious needle and sterile tubing and collected blood into a sterile container. This blood will start to clot almost immediately unless an anti-coagulant is used. Making an anti-coagulant which doesn't also make the blood unusable is an entire story by itself. Luckily, for making antisera, we don't care, the blood can clot. This clotting will tie down all the cells in the clot. Now we can isolate the serum. The way it is done in a modern lab is by centrifugation. The blood is separated in tubes and these are spun around with enough centrifugal force to have the red blood cells settle on the bottom and leave the serum on top. This serum can then be drawn off by a sterile pipette and can be immediately used or stored refrigerated for a couple of months. The centrifugation itself is not very difficult, and even simple hand-cranked devices will work and can be readily made and designed in Grantville.

The last step is to place this serum in a syringe or more likely an IV bag/bottle and let it drip into the patient. The amount that one would have to provide a patient is not trivial. Since a person's serum contains all the different antibodies that person produces, the antibodies against the one disease you are trying to protect the patient against may not be all that abundant. That means anywhere between 100 ml to a liter of serum may be needed. On average about 250 ml should suffice. That is about the amount of serum you can get from a person giving a unit of blood. If you average that out, you have to have a donor for every one or two patients. That is a lot of needle work, a lot of tubing and work to help relatively few patients.

The way we solved this in the modern era is to concentrate the antiserum into an "antidote." As it turns out, the antibodies present in the serum can be isolated. This can be done by letting the antibodies precipitate out of the serum by adding in acetone and centrifuging the precipitating antibodies down. This leaves a pellet that can be dissolved in a much smaller volume of saline than the original serum. Now this adds a few items on the list for things to have. It requires relatively pure acetone which is quite a simple organic chemical but would still need to be made without the presence of other potentially dangerous organic substances. By concentrating and storing the antibodies from people in saline and refrigerating or even freezing these concentrated antidotes, you can potentially keep them around for years. Antibodies are fairly hardy proteins which normally last on average about 3 weeks in the human blood stream. When frozen they can last for decades, and refrigerated they can last for at least a year. Thus, if I were on the medical committee in Grantville shortly after the Ring of Fire, with the first refugees coming in to take shelter in Grantville would be quite a few people who will have survived various diseases. It makes sense to interview these people and if it can be determined that certain people had been in recent contact with particular diseases because they still have a sick relative with them for example, to have some blood drawn and start to make a small but highly useful stockpile of antidotes against various down-time diseases. Similarly, the doctor's records will show who were the last people to be vaccinated. The individuals would be very useful as donors for immune serum against various

diseases for which they now no longer have readily available vaccines, such as tetanus, measles, mumps, rubella and so forth. These small stockpiles will be useful for small outbreaks of disease, but a serious epidemic would quickly exhaust it.

***What diseases will they focus on?***

The first diseases to focus on are those which historically have a good track record for being treated with antibodies. That would most definitely be diphtheria and tetanus. Making the vaccine against these diseases is definitely not trivial, since both organisms are anaerobic, meaning they live and replicate under circumstances where there is no oxygen around. Only then do they make the toxins which are so dangerous to human health. It is precisely because these toxins are so potent, that making the toxoids for the vaccine is very difficult and would require a lot of safety procedures to prevent people from getting killed just making it. That means recent vaccinées would be selected and asked for donations. The other diseases people have been vaccinated against would follow. Vaccines being something which has become mostly something given to the very young, it is difficult to wish to drain a substantial amount of blood from a two year old. Aside from the parents concern, the child simply doesn't have that much blood to give. Especially since a little doesn't go a long way, I feel it is likely for most childhood vaccinations very little antiserum would be stockpiled.

The strongest focus would be in the communities surrounding Grantville. Many cities and towns of the era maintained "plague" houses outside the city walls. This would be where, especially the poor and destitute were sent to convalesce or more often to die when they became ill. In times of epidemics these facilities would be full of people with a particular disease. Coming in as up-time medics, I can imagine creating good will by curing people suffering from diseases which we know how to cure and then exacting a price in blood. Since bloodletting was such a common phenomenon in the era, this would not even be seen as strange, although, asking relatives of the patient for blood rather than the patient him/herself may require some degree of diplomatic persuasion.

Diseases I think, which would invoke a strong response by the Grantville medical community, would be typhoid, typhus, cholera, the plague in both bubonic and pneumatic varieties, smallpox, measles and diphtheria. In lieu of vaccines, antiserum will have to be a first line of defense. The early modern era, being what it is, rife with disease, I wouldn't think it would have been long before this method of defense would be tested, especially in a Germany with large armies moving about and refugees all over the map.

***What kind of results would the use of antidotes have on health, epidemics in specific?***

How much of an impact can these antidotes make? Considering this method would be hard pressed to help more than a few dozen people at first. What it would require is a lot of planning and as much stockpiling as possible of relevant antidotes as different diseases manifest themselves. Here it will not make sense to take a defensive position. Disease will not pass by a community such as Grantville, which has such a large highly susceptible population with so little immunity against the majority of serious down-time diseases. That means public hygiene becomes the concern of everyone. Diseases need to be reported rapidly and quarantines established. Local down-time communities have to be monitored for the appearance of different diseases, even ones which the locals may not take much notice of. Overall, the medical community becomes as much an army in defense of Grantville as those carrying guns. That requires the logistics and support to create the infrastructure, as well as the foot soldiers to take the fight to the enemies. In that overall scheme, antidotes would play a vital role in being able to contain disease

quickly and cure those people coming down with disease. This system would become overwhelmed during a massive epidemic, but in situations of lesser medical disaster, the use of the antidotes can change the disease impact on a community severely. Where diphtheria could end up killing as much as 30% of people, mostly children not previously exposed, the use of the antidotes in a timely manner could reduce that to close to zero.

### ***Conclusions***

Providing the early modern era with the means to take on serious killers by means of antidotes could be among the greatest gifts of Grantville to the early modern world. Even though it will be difficult to implement the infrastructure to produce antidotes, the major impact it has in making the difference between life and death, will make it a technology which they will not leave on the backburner. They have the knowledge of an effective means to fight death and the many paths that can lead to it and they will use this ability to drive the grim reaper back. Childhood mortality in Grantville itself should remain low. By spreading the germ theory and rapid response of medical units to the sites of emerging epidemics, antidotes will be highly effective. All in all, it makes me wonder what they are going to do in regards to birth control. ;o).

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# Soundings and Sextants, Part One, Navigational Instruments Old and New

Written by Iver P. Cooper

In *Mr. Midshipman Hornblower*, the tyrannical senior midshipman, Mr. Simpson, given a navigation problem by the sailing master, computes the ship's position as being in Central Africa. The captain acidly praises him for discovering the source of the Nile. Poor Hornblower, the most junior midshipman, is the only one with the correct answer; "everybody else had added the correction for refraction instead of subtracting it, or had worked out the multiplication wrongly, or had (like Simpson) botched the whole problem."

The errors made by Hornblower's peers differ only in degree from the real-life errors that were made by countless navigators, sometimes with the result that the ship ran aground, or sank. This is the first of two articles which will examine the art of navigation in the early seventeenth century, and what a bunch of landlubbers from Grantville (over two hundred miles from the ocean) can do to improve it. This article will focus on navigational instruments in the broad sense, while the sequel will address the celestial navigation methods by which longitude and latitude are determined.

## ***Guides to Navigation***

For down-timers, the leading English practical textbooks are William Bourne's *Regiment for the Sea* (1573, 1631), which was based on Martin Cortes' *Arte de Navegar* (1551); Thomas Blundeville's *Exercises* (1594, 1597, 1606, 1613); John Davis' *Seamans Secrets* (1594); Edward Wright's *Certain Errors in Navigation* (1599); Richard Polter's *The Pathway to Perfect Sailing* (1605, 1613); and Thomas Addison's *Arithmetical Navigation* (1625). For those more mathematically inclined, there was Robert Tanner's *Brief Treatise of the Use of the Globe Celestial and Terrestrial* (1620), in eight volumes. And if you were more interested in navigational instruments, you could consult Anthony Ashley's *Mariner's Mirrour* (1588), William Barlow's *The Navigator's Supply* (1597), and various books by Edmund Gunter (1632, 1624, 1630 and 1636). (Swanick 57-67).

There are also various astronomical almanacs, but those will be discussed in the second article.

Grantville being far from the sea, it is not a likely repository for nautical texts. However, the consensus of the Editorial Board is that there will be at least a couple of editions of Bowditch's *American Practical Navigator* around (several having been found at a used bookstore in Parkersburg, West Virginia, and the Up-timer's Grid listing both Jack Clements, a retired Coast Guard boat pilot, and of course the aviator Jesse Wood). Even if we ignore APN, there are a surprisingly large number of useful entries in the 1911 *Encyclopedia Britannica*, and there are books on astronomy and mathematics in the school libraries. And the atlases and National Geographic maps will no doubt come in handy.

## ***Navigation by Terrestrial Signs***

***Landmarks*** . The simplest form of navigation is to take note of prominent landscape features, and their bearings. Ideally, you take cross-bearings (simultaneous bearings of two different landmarks, lying in different directions), because that fixes your position. Lighthouses and buoys, of course, can be considered artificial landmarks.

Knowledge of landmarks was initially confined to local sailors. However, it became customary for long-distance mariners to draw "profiles" of the coasts they visited in their logbooks (Taylor 168). These sketches could be passed on to allied captains.

The "knowhow" of sailors was distilled into guidebooks known in ancient times as periplous, and, later as portolans, rutters and waggons. They could include charts, profiles, and logbook summaries. The most famous of them all was Lucas Wagaenaer's *Mariner's Mirror* (1584). Sailing directions are primarily directed to coastal navigation.



*Soundings* . In shallow waters, including the North Sea and Baltic Sea, it was common to navigate by soundings. This involved dropping a sounding line, a knotted rope with a lead weight, to the bottom. The number of knots passing over the side gave the depth. The weight could be "armed" with tallow to pick up sediment from the sea floor. Sailing instructions would tell mariners what to expect. For example, it might say that you have reached the shallow region between Cape Clear and the Isles of Scilly, when "at 72 fathoms [you] find fair gray sand" (Aczel, 12-3, 134-5).

The modern lead line is distinctively marked so that the leadsman can recognize the marks by feel even in the dark: two strips of leather at two fathoms, three at three, a white cotton rag at five, red woolen bunting at seven, and so on. The standard lines are twenty and one hundred fathoms long. (Mixer 11).

A sounding machine was invented by Lord Kelvin in the nineteenth century, and such machines are described in 1911EB. Soundings can be taken day or night, under harsh sea and wind conditions, and up to depths of several thousand fathoms, using galvanized steel wires which are reeled back in by an engine.

A twentieth century alternative to the sounding line is the fathometer, a SONAR-based echo sounder (Togholt 37). Unfortunately, I don't know enough about electronics to venture a guess as to when these can be built, post-RoF.

Several up-time fishing fathometers made it through the RoF. The first reference in canon is in 1633 chapter 38: "At least I could send them out ahead with Al's fishing fathometer to look for the really shallow spots." In chapter 46, Eddie, in the powerboat Outlaw, says, "We ought to have enough water, and we'll keep an eye on the fathometer.' He tapped the digital depth display, and Larry nodded again." 1634: *The Baltic War*, Chap. 34 reveals the existence of at least six fishing fathometers, two on the "up-time power boats leading the ponderous line of gunboats," and the remainder on Simpson's four ironclads.

The immediate contribution which the up-timers can make to navigation by soundings is to provide copies of up-time maps with depth markings. There is typically some sounding information on National Geographic maps. Of course, it is unlikely that anyone in landlocked Grantville has the detailed marine charts of coastal waters and, even if they did, they probably don't correspond too well to seventeenth century reality; coasts and bottoms change over time.

*Other signs* . Those who live on the sea (and die there if they are unobservant) tend to notice subtle cues as to where they are. These include the color of the sea, the typical currents and winds, bird and fish movements, and clouds which hover over islands and perhaps even reflect the color of the land below. (Taylor, 59-60, Calahan 82).

One modern contribution might be the use of the thermometer. By sampling water temperature, you can map out currents.

### ***Terrestrial Latitude and Longitude***

While we may not have thought so in high school, one of the great intellectual inventions of mankind is the coordinate system. For example, if a city is laid out as a grid, we can send someone to the intersection of, say, North Tenth Street and East Third Avenue.

Latitude and longitude are the dimensions of a gridded spherical surface coordinate system first devised by the ancient Greeks. The earth is not a perfect sphere, but for our present purposes, it is close enough. Imagine the Earth as a hollow, see-through globe, with you hovering somehow at the center. If your body were aligned with the earth's axis, you could identify any point on the earth's surface by two angles, one measuring "up-and-down" relative to "level" (latitude) and the other "left-and-right" relative to "front" (longitude).

For each of these angles, we need a reference, a "zero." For latitude, it is the earth's equator, the intersection of the earth's surface with an imaginary plane perpendicular to the axis. Any point on the equator is zero degrees latitude. Angles are traditionally measured in degrees; by ancient convention, a circle is divided into 360 degrees (each degree, symbol  $d^{\circ}$ , is divided into sixty arc minutes, symbol  $'$ , and each minute into sixty arc seconds, symbol  $"$ ). Above your head would be the north pole, defined as 90 degrees north latitude. Below your feet, the south pole, at 90 degrees south latitude, sometimes represented as  $-90$  degrees.

Except at the poles, the points on the earth's surface which have a particular value of the latitude form a circle on the earth's surface; the circles are parallel to each other (that is, they maintain a constant distance), and hence are also known as "parallels" (e.g., the 49th parallel, part of the border between Canada and the western United States).

The "lines" (really, half-circles) of constant longitude are called meridians. For longitude, we have to pick an arbitrary zero. Hipparchus proposed using a meridian which passed through the city of Rhodes. Currently, the zero longitude (prime) meridian is one established by an 1884 international treaty, and passes through the Royal Observatory at Greenwich, England. Longitude is measured as being so many degrees (up to 180) east or west of the prime meridian.

On a globe, the "lines" (circles) of latitude will always cross the "lines" (circles) of longitude at right angles. (A map may distort this relationship.)

If two points are on the same meridian (constant longitude), but one degree of latitude apart, that's a distance of about 69 miles. It would be the same distance, regardless of where you were, if the earth was a perfect sphere. So an error of one degree latitude corresponds to 69 miles. An error of one arc-minute ( $'$ ), 1.15 miles. An error of one arc-second ( $"$ ), 100 feet.

If two points are on the same parallel (constant latitude), but one degree of longitude apart, the distance between them would be a maximum of 69 miles (at the equator). The further away they are from the equator, the shorter the distance would be.

In 1632, the down-timers did not know the true length of a degree of latitude. However, it was measured with high precision (error  $<1\%$ ) in 1637 (EB11/Navigation). They did know the relative length of a degree of longitude, given the latitude, having published (1599) tables of "meridional parts."

Thanks to land observations, the down-timers know the latitudes of many ports. Even those given in the *Regiment of the Astrolabe* (1509) are accurate to 30', sometimes even 10' (Taylor 166).

### ***Globes and Maps***

Globes, like the earth, are spherical. Maps are flat. As you can verify by trying to flatten out the skin of an orange while keeping it as a single piece, some creativity is required to flatten out a spherical surface.

The technical term for the mathematical manipulation by which points on a spherical surface are converted to points on a flat surface is "projection." Any map projection is going to distort certain properties of the earth's surface, and, hopefully, preserve others. Projections can preserve direction from a central point (azimuthal projection), distance from a central point (equidistant), local shape (conformal), area (equiareal), etc. You need to use the right map projection for a particular purpose.

It should be noted that the down-time mathematicians know quite a bit about map projections. For example, Oronce Fine (1494-1555) invented a heart-shaped projection. The empirically developed Mercator (1512-1594) projection, given proper mathematical form by Wright (1599), is still used for navigation.

### ***Great Circles and Rhumb Lines***

A great circle (orthodrome) is a circle on a sphere which has the same diameter of the sphere, and thus divides the sphere into two hemispheres. The equator (zero latitude) is a great circle, and the meridians are portions of great circles (with constant longitude).

However, these are special cases, and great circles can connect points which differ in both latitude and longitude.

If a map uses a gnomonic map projection, great circles are shown as straight lines. On a mercator projection, they are curves.

The shortest distance between any two points on the surface of a sphere is a portion of the great circle which connects the two points. Unfortunately, traveling on a great circle path requires continual correction of one's compass heading. Great circle sailing can also carry one to a higher latitude than is desirable (too much ice and fog).

A rhumb line (loxodrome) is a path on the spherical earth which corresponds to following a constant true compass bearing (azimuth), or, to put it another way, to crossing every meridian at the same angle. If a map uses a mercator projection, rhumb lines are straight lines. Parallel sailing is a special case of rhumb line sailing in which one sails along a parallel (line of latitude), thereby crossing every meridian at right angles.

As a compromise between minimizing the distance (great circle route) and facilitating steering (rhumb line), a great circle route may be approximated by a series of short rhumb lines connecting waypoints which lie on the great circle.

Composite sailing is a combination of great circle sailing to and from some limiting parallel, and parallel sailing in-between.

### **Dead Reckoning**

In dead reckoning, the navigator plots the last known location on a chart, and extrapolates the present location based on the ship's subsequent heading(s), speed(s), and time elapsed.

The Spanish called dead reckoning, *navegacion de fantasia* (Gurney 19), and Edward Wright (1599) referred to the estimated position as "the point of imagination." (Williams) DR estimates of longitude were sometimes over 400 miles astray (Wakefield 165).

Surface currents usually exceed ten miles per day (mpd) and in many places are 40-50 mpd. If currents are ignored, the dead reckoning will accumulate error at a rate of 10-50 mpd. Even in the late eighteenth century, long-distance journeys typically accrued longitude errors of 5-15d\* (Parr 68-9).

The *Traverse Board* was a device used to keep track of the courses steered. Every half-hour, a peg would be placed in one of 32 holes, each representing one point of the compass. There were eight such concentric circles of holes, thus recording an entire four hour watch. (Phillip-Birt 191).

Of course, steering a particular course didn't mean that the ship necessarily moved in the expected direction. The helmsman could be lax, the ship's steering arrangement could be inaccurate, and the ship could be forced off course by powerful winds and currents.

The prudent navigator attempted to estimate "leeway" (the extent to which the ship was forced off course) by looking at the angle between the wake and the heading. (Williams 22)

Moreover, even if the ship was placed on the desired compass bearing, that bearing might not be the desired true bearing, by reason of errors in correcting for magnetic variation and deviation, or of determining true north from the sky.

*Logging Speed* . For measuring speed, the sailor used a log. The *common log* was a piece of wood tied to a knotted line. The log was thrown out behind the ship, and the line allowed to run out. One sailor counted the knots as they passed over the rail, while another watched a sand glass. The count continued until the sand glass emptied. The first written description of this method was in William Bourne's *A Regiment for the Sea* (1574)(Williams 39 n. 3), and the log was in general use, at least by the English and Dutch, in the 1620s (Swanick 100).

The sailing term "knots" refers to the fact that sailors estimated their speed, in nautical miles per hour, as the number of knots run out per "glass." A knot is one nautical mile (6,076 feet, about one arc-minute of latitude.) per hour. Earlier schemes overestimated speed (perhaps deliberately), but the late eighteenth century, sailors used a knot spacing of 47.25 feet and a 28 second glass. (Gurney 25; Phillip-Birt 196)

There are some other obvious problems with this method. The log might be caught in the ship's wake, and the line not pay out properly. There might be little delays in calling out the end of the time interval. The knot counter might miscount, or have trouble estimating an intermediate value. The speed of the ship might change, after the fact, as a result of shifts in wind and current.

An alternative form of the common log was the "Dutchman's log": throw a chip off the bow and time how long it takes to reach it. (Mixer 12)

The common log was ultimately replaced by the *patent log*. This was a towed rotator, with spiral fins (Togholt 36). The passing water caused it to spin, and the rotations were mechanically communicated to a mechanical counting device. The patent log had to be calibrated by testing it on a run of a known length. Preferably you carried out two runs in opposite directions, so as to reduce the effect of any local current.

A steamship engineer could construct a power curve relating ship speed to engine speed (RPM) by carrying out similar runs at each of several engine speeds. Then the engine tachometer could be used as a log. (Mixer 13-15).

To get the distance run, the navigator multiplied the speed (presumed constant) by the time elapsed. Measuring shipboard time in the early seventeenth century was a rather chancy proposition, typically involving sandglasses.

*Plotting*. When dead reckoning is figured as if the earth is flat, that is called "plane sailing." For a DR plot to be accurate over long distances, you need to use a Mercator projection chart, or correct your eastings and westings for the changing length of a degree of longitude. The corrections are carried out with a table of meridional parts, which were first published in Wright's *Certain Errors in Navigation* (1599). But in the late seventeenth century, Sir John Narborough said, "I could wish all seamen would give over sailing by the false plane charts and sail by the Mercator's chart . . . but it is a hard matter to convince any of the old navigators." (Williams 43-6).

### **Navigational Use of the Compass**

The compass has two purposes: determining which course is being steered, and providing a reference point for the measurement of azimuth (horizontal direction) in celestial navigation. An error of 3d\* in setting the course of the ship results in a positional error of one mile for every twenty miles run (Mixer 48).

*Magnetic Compass* . The standard magnetic compass has a magnetized needle which only swings horizontally. However, there are also "dip" compasses which can pivot vertically, too.

The marine compass typically has a rotatable compass card, marked with the compass directions. At least one magnetized needle is attached to the underside of the card. (Unlike the boy scout compass, in which the needle turns, and the card is stationary.) The earth's magnetic field causes the needle, and with it the compass card, to turn on its axis until the needle is properly aligned with the local magnetic field.

Needles were magnetized by stroking them with an artificial or natural magnet (lodestone). The up-timers can teach how to magnetize steel rods by inserting them into a current carrying coil.

Increasing the number of needles makes the compass more sensitive, and it thus performs better when the sea is quiet, but then it oscillates too much when the waters are rough (Walker 72).

The compass used by the down-timers is "dry," the card pivots on a vertical pin, inside an empty bowl (Gurney 25). The epitome of the dry compass is, perhaps, the Admiralty Standard Compass, introduced in 1840 and still in use a century later (Gurney 208-10). It, together with the temperamental 1876 Thomson patent compass (240-64), are discussed in 1911EB.

In the wet form, the compass card is still attached to the needle, but they are floating on some kind of liquid, preferably a viscous one. The dry compass was favored during the sailing ship era, but steamship engine vibrations forced the eventual adoption of the wet version (Williams 136-7; Gurney 264-72), like the Ritchie model described by 1911EB .

Down-time, you had to be careful where you bought your compass. For example, in northern Europe, compasses frequently had hidden offsets (needle at angle away from north on card) of 6-11d\*, to compensate for magnetic variation. On the other hand, Italian-made compasses lacked these offsets. (Gurney 63). An unsuspecting soul who bought a northern compass and then tried to use it in the Mediterranean could get an unpleasant surprise.

Curiously, compasses weren't routinely tested until the nineteenth century. After the 1707 Scillies disaster, the Navy inspected its compass inventory, and found that only three out of 145 were working properly (Wakefield 45).

The magnetic compass is subject to a number of inherent errors (earth's variation and ship's deviation), so mariners speak of three different kinds of directions: compass, magnetic (compass direction adjusted for deviation), and true (magnetic direction adjusted for variation). A surveyor, such as Grantville's Mason Chaffin, should be quite familiar with the phenomena of magnetic deviation and variation.

*Magnetic Variation* . The magnetic compass works, ultimately, because 1) the earth has a liquid iron outer core, 2) the molten iron is in constant motion, and 3) at least some of that motion is attributable to the rotation of the earth. The result is that a magnetic field is generated which, very loosely speaking, has one pole (place where a "dip" compass would point straight down) near the earth's true North Pole, and the other near the true South Pole. However, the earth's magnetic field is not a simple field, with two geometrically opposite poles, like the one generated by a bar magnet. Hence, the compass needles don't necessarily point exactly toward the true poles.

The difference, expressed as so many degrees to the east or west of true north (or south), is called variation (or declination), and differs depending on where on the earth the compass is situated. Variation is unaffected by heading, and compensation with counter-magnets is not possible. But it varies with location (and time). It is thus essential, especially when sailing great distances, to keep track of the magnetic variation so that the correct course can be steered.

The down-timers are well aware of the existence of magnetic variation. According to Williams (26), magnetic variation was first indicated on a European chart in about 1504. Cape of Good Hope is called Cape Aguilhas ("Needles") by Portuguese because of the way the compass misbehaves in its vicinity (Walker 1). Mercator tried to explain variation by postulating first one (1546) and then two (1569) north magnetic poles (NRC).

Nonetheless, one of the reasons for the loss of the English fleet off the Scillies in 1707 was that their navigators didn't make allowance for the magnetic variation in the region (7.5d\*W at the time)(Gurney 95-6).

Determining a compass' variation requires taking the compass bearing of an object whose true bearing is known:

- \* Celestial object—The most commonly used celestial objects are Polaris, and the rising or setting Sun. While Polaris is always very close to true North, the Sun moves about, so you need to compute or look up its azimuth for a particular day and time.
- \* Landmark—If you have an accurate chart, and your ship's position is known, take the bearing of a landmark shown on the chart.
- \* Place Line—If your position is not known, sail so that two landmarks shown on the chart line up. Preferably, the landmarks are far apart.

An example of calculating magnetic variation was given by Hariot in 1595. The azimuth of sunrise was measured with the meridian compass, the simultaneous solar declination was estimated from successive noon values in the *Book of the Sun's Regiment*, and that was used as an entry, together with the ship's latitude, into Hariot's "Table of Amplitudes," arriving at the true azimuth of the sun. The variation was the difference between the true and observed azimuths. (Taylor 221).

Determining the variation at a particular location is a bit tricky. Both daily and annual fluctuations occur. At Cheltenham, West Virginia, the westernmost declination is at 2 p.m., and the easternmost at 8 or 9 a.m. If time of year is considered, the range is from 6d\*E on a summer morning, to 4.8d\*W on an equinoctial afternoon (Sipe 77).

The Chief Pilot of the Portuguese India Fleet, De Castro, made numerous measurements of variation around 1540 and asserted that it

could be measured with an accuracy of  $0.5d^*$  on smooth water and  $2d^*$  when the ship was rolling (Taylor 183).

The first map of magnetic declinations was made by Edmund Halley in 1699. I don't think a copy of that map made it through the RoF, but the 1911EB has a world map showing the magnetic variation (declination) as of 1907. The contour lines connect points at which the variation is the same, that is, so many degrees to the east or west of north.

Unfortunately, the 1907 map is virtually useless in the 1630s (and the same would be true of Halley's), because the magnetic variation changes dramatically over time.

The conventional wisdom in 1600 was that the variation was fixed (as taught by Gilbert in *De Magnete*). But by the time of the RoF, the down-timers already had collected evidence that Gilbert was mistaken. For example, Borough found that the declination at London in 1580 was  $11d^*4'E$ , while in 1622, Gunter said that it was only  $6d^*13'E$ . The discrepancy was at first ascribed to experimental errors. Sometime in OTL 1633, Henry Gillebrand began to suspect, based on new observations, that the declination had continued to trend westward, and he became sure of this in midsummer 1634 (and published his findings in 1635). This is explained at length in 1911EB "Magnetism", which offers numerous tables showing the change in declination in different parts of the world.

This "secular change" is just as geographically diverse as magnetic variation itself. Even outside the polar regions, it can be as fast as a  $20d^*$  shift in one year.

One silver lining is that, for a specific location, the change is fairly close to constant (Bloxham). Hence, local maps (like the USGS quadrangle maps) can be published which state both the current variation, and the annual rate of change, and they are then useable for a few decades for local compass correction.

The other is that, if archaeomagnetic data is fitted to a standard geomagnetic model (Van Gent; Pickering), it appears that the early seventeenth century might have been a relatively good time to rely on a magnetic compass. Van Gent's 1600 map suggests that for Atlantic voyages between  $60d^*N$  and  $30d^*N$ , the declination was usually not more than  $10d^*$  (the exceptions were between Newfoundland and Greenland, and in the SW Atlantic). Declinations were also less than  $10d^*$  in the waters lying in the Australia-SE Asia-Japan triangle.

If you are writing a story and you need to know the magnetic variation in a particular part of the world in the seventeenth century, I suggest taking a look at the tenth order CALS3K model (Pickering) and its successors.

*Magnetic Deviation* . The errors in magnetic compass bearings which are attributable to the ship and its contents are called deviations. They can vary depending on where the compass is located, and the direction of the ship's heading.

The earth's magnetic field induces transient magnetism in soft iron, and the resulting deviation is greatest when the ship is on an easterly or westerly course. Even in a wooden ship, there are iron items. João de Castro's 1538 observation of variation were "troubled by the proximity of artillery pieces, anchors and other iron." (Gurney 139)

These "soft iron" deviations change as the ship moves north or south (changes magnetic latitude). The force induced in "horizontal iron" (such as a beam) is greatest at the equator, least at the poles. The reverse is true for vertical iron, and its direction reverses when the ship crosses the magnetic equator. Vertical soft iron in early 19C sailing ships included "hanging knees, nails, and bolts in the deck, the capstan spindle, anchor flukes, stanchions, chain plates, belaying pins, rudder stock." (180).

In wooden ships, the deviation is greatest when the ship is on an easterly or westerly course (Walker 67); this is the result of asymmetrical vertical soft iron, forward or aft of the compass (NGIA 13). Bear in mind that the compass is by the helmsman, at the rear of the ship.

Downie, master in *HMS Glory*, 1790, wrote: "I am convinced that the quantity and vicinity of iron, in most ships, has an effect in attracting the needle . . . the needle will not always point in the same direction, when placed in different parts of a ship . . . [T]wo ships, steering the same course by their respective compasses, will not go exactly parallel to each other yet when their compasses are on board the same ship, they will agree exactly." (Walker 11)

A small amount of iron close to the compass can be as disturbing as a large mass further away. A belt buckle, moved closer than twelve inches, can cause a deviation. So can a ballpoint pen at five inches, or a wristwatch with a metal band a foot away, a knife at two feet, or a metal handle axe at four (Sipe 84-5). With some qualifications, the magnetic field strength is inversely proportional to the cube of the distance (83).

As you might expect, deviation became a greater concern in the nineteenth century when iron hulls were introduced. The deviations experienced on an iron ship can exceed  $50d^*$ ! (Gurney 189, 200, 217). When the steel is hammered, bent, riveted or welded, the earth's magnetic field imprints it, converting it into a "subpermanent" magnet which records the direction the ship was "headed" when built. (Mixer 60-1). This "semicircular" deviation can be observed on any heading, as it is maximized when the subpermanent dipole is at right angles to the compass needle.

Deviation is measured by "swinging the ship"; placing the ship on each standard heading and comparing the compass bearing to the true one. The known variation (unaffected by heading) is taken into account, and the residual error is the deviation.

There are two basic approaches to dealing with deviation. The 19C British Navy method was to never assume that the compass was correct; rather, routinely swing the ship. The Merchant Marine approach was to judiciously place counter-magnets so as to counterbalance the deviation. This can be tricky, especially until the underlying theory is rediscovered. (Gurney, 255-6; Togholt, 24-5;

Williams 131-6). Some correction, at least, is desirable on iron ships, since large deviations can cause the compass needle to become sluggish or erratic.

*Magnetic Dip.* The first compasses had a needle which could only pivot horizontally. In 1581, Robert Norman discovered that if the needle were permitted to move vertically, it would dip (Walker 9-10). This magnetic "inclination" of the needle varies across the world. The needle will point straight down at the magnetic poles, and is flat at the magnetic equator (a wavy line ranging perhaps 10d\* north and south of the true equator). The unreliability of magnetic compasses in the polar regions is a consequence of dip; the magnetic force on the needle is then primarily vertical, and the needle may be more responsive to ship movement than to the tiny horizontal magnetic force.

In 1602, Gilbert and colleagues suggested that dip could be used to determine latitude when the sky was overcast (Taylor 247). This was a forlorn hope; points of equal dip are not uncommonly 20-30d\* latitude apart.

Looking at the NOAA 2005 World Magnetic Model, it appears that the lines of equal inclination are fairly shallowly sloped between around 60d\*N and 30d\*S (except near the Cape of Good Hope), so that if dip were regularly measured along with latitude, it might be possible, in a pinch, to estimate the *change* in latitude based on the *change* of dip. However, this probably wouldn't be known to anyone in the 1632 Universe until there was a systematic study of magnetic dip.

Dipping needles are nonetheless useful in correcting the deviation observed when a ship heels over (tilts).

*Gyrocompass.* A gyroscope is a device designed so that it can spin rapidly, and mounted so that its axis can point in any direction. The axis will continue to point in the spin-up direction unless it is disturbed by an external force. The combination of the earth's gravitational force, and the centrifugal force imparted by earth's rotation, causes it to precess so it points to true north (and south). Changes in the ship's heading don't change the forces acting on the gyroscope so it will continue to point that way. The principle of the gyroscope was enunciated by Foucault in 1852, and the first gyrocompass was installed by Sperry in 1910 (Mixer 73).

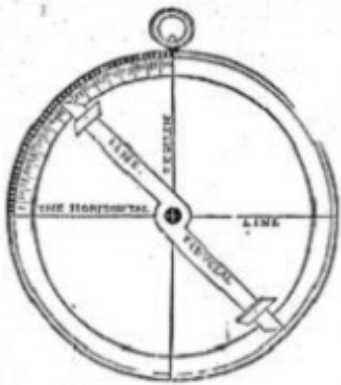
The gyrocompass has the advantage of pointing to True North; it is not subject to magnetic variation or deviation. And a properly adjusted gyrocompass is usually accurate to one degree or better. However, it requires constant electrical power (to keep the gyro spinning), and its accuracy decreases as the ship moves about 75 degrees latitude. (Dutton 171). Of course, the latter problem is also experienced with magnetic compasses, which tend to go haywire in polar regions. I don't know when gyrocompasses will become available.

### **Altitude and Azimuth**

For celestial navigation (see second article), we will need to be able to describe the positions of celestial objects. From the observer's standpoint, the easiest system is to measure the angle between the object and the horizon (altitude) and between the horizontal direction to the object and true north (azimuth). While both altitude and azimuth are needed to completely define the position of an object in the sky, many celestial navigation problems are solved just by use of multiple altitude readings. Azimuth is used mostly for correction of compasses.

### **Measuring Altitude**

To measure altitude, you need a reference, either "down" (established by a plumb line) or "level" (the true horizon). Unfortunately, at sea, plumb lines sway, and horizons are obscured by mist, waves, and spindrift (Callaghan 154).



*Down-time Instruments.* The down-timers had several devices to use for measuring altitude. The first was the mariner's astrolabe. This had a circular scale, and a radially mounted, rotatable arm (*alidade*) holding a pointer and a sight at each end. The astrolabe was suspended from a cord so it would be vertical. You eyed the star through the two sights and then read off the altitude from where the pointer crossed the scale. For a sun sight, you let the sun shine through one hole and illuminate the other.

One person steadied it, a second took the sighting, and a third read off the altitude. The larger the astrolabe, the more accurate were its measurements. A seven inch diameter astrolabe might be read to thirty arc-minutes, and a two-footer to ten (Graham). However, large astrolabes were cumbersome to use. Sometimes, the navigator made a landing just so the astrolabe could be used more easily. (Miller) Then there was the "sea ring." In one version, the sun shone, through a hole, onto a scale engraved on the inner surface. In another, the sun cast a shadow onto the scale. Like the astrolabe, the "sea ring" was a hung device which didn't need a horizon. (Swanick 87-88).

Another device was the simple quadrant, not to be confused with the later Davis quadrant. It was first used at sea in 1461. It was a quarter-circle arc, with sights along one straight edge. A plumb line hung from the vertex. One sailor sighted through the two holes while another read off where the plumb line cross the scale on the rim of the arc. (Williams 35)

According to John Davis (1595), the astrolabe and quadrant were difficult to use on shipboard, except when the sea was calm. (Phillips-Birt 139) You can imagine the astrolabe, or the plumb bob of the quadrant, careening wildly as the ship was buffeted by waves.

By the 1630s, these devices had been largely superseded by the cross-staff (forestaff), consisting of a staff and a sliding transom (the cross-piece). You put your eye at one end of the staff, and slid the transom toward or away from you along the staff, until the top of the transom was aligned with the star and the other end with the horizon. Since you looked somewhat like an archer, this was called shooting the stars. The staff was graduated so you could read off the location of the cross-piece. While the cross-staff could be used by one person, it was awkward to keep both the horizon and the celestial object aligned, simultaneously.

The sixteenth century cross-staff came with three or four cross-pieces, of different lengths. Typically, the staff was about 2.5-3 feet, and the transoms were 15, 10 and 6 inches long. The largest would be used when the star was high in the sky, and the smallest when it was close to the horizon (which would be the case for the North Star when a ship was near the equator). For each, there was a table for converting the location of the transom to the observed angle.

The length of the staff and cross-pieces dictated its region of usefulness; Swanick (76) says that it could only be used to sight objects between twenty and sixty degrees altitude, which would be degrees of latitude in the case of the Polestar. The cross-staff was best used when the altitude was substantially less than sixty degrees, since for higher elevations, the corresponding graduations on the staff were small. (Phillips-Birt 128, 145)

Digges' *Prognostications* also warned the down-timers that there is a parallax problem with the cross-staff; it would yield the correct altitude only if the eye were at the center of the staff (Taylor 206). Since the staff wasn't transparent, that was impractical, so the user had to make a downward correction to the nominal altitude. Harriot actually calculated the necessary individual correction for Raleigh and certain other English explorers, but on average it was about 1.5d\* (Taylor 220).

A modern test of a cross-staff replica, carried out at Lumberton, Mississippi (latitude 31.6d) resulted in readings of 32, 31.5, and 33d\* latitude (calculated as altitude of Polaris) from one scale and 31.5, 32 and 31.5 for the other. This was done, remember, on land. It looks like the angular accuracy of a cross-staff was 0.5-1.5d\*. (Cookman)

A similar device, the back-staff, was used for solar observation. Instead of the transom it had an element which cast a shadow back along the staff. With his back to the sun, the mariner slid the element until the shadow just touched the far end of the staff, and then read off the location of the slider. A table gave the corresponding angle.

The "state-of-the-art" on the eve of RoF was the Davis Quadrant, first described in John Davis' *Seaman's Secrets* (1595). It was called a quadrant, because it could measure angles up to 90 degrees (one quarter circle) It was also called a back staff, because, like the first back staff, it was a back sight instrument. That is, you observed not the sun itself, but the shadow it cast (which saved your eyesight, but also meant that you couldn't sight the stars)(Callaghan 157).

The Davis Quadrant had two arcs (vanes), one atop the other, with the same pivot point. The upper and lower vanes each have an attached slit, and there is a third slit next to the pivot point. You look at the horizon through the lower vane and pivot slits, and you adjust the upper vane so the sunlight passes through the upper vane slit onto the pivot slit.

The scale of the Davis quadrant might have 0.5d\* divisions, and quadrants could be read to perhaps 0.25d\* (Taylor 215). However, in 1631, (Miller), Pierre Vernier described the Vernier scale, by which a scale could be read to the nearest arc minute. The even more accurate micrometer was invented at the end of that decade (Gascoigne, 1639) but ignored until much later.

*The Double Reflection Octant and Sextant* . The first double reflection instrument was the Hadley octant (1731). It had a markedly different operating principle than the prior instruments. There are two mirrors. The first, the fixed horizon mirror, is only partially silvered. You sight the horizon through the unsilvered portion. There is also a rotatable index mirror, which is attached to a pointer. You rotate the index mirror until you can see the celestial object's second reflection in the silvered half of the horizon mirror, then check the pointer against the scale. The Hadley octant had a magnified scale, giving it an accuracy of 1-2' in Admiralty tests. (Taylor 257; Callaghan 158, 164).

The term "octant" arose because the frame was a one-eighth slice of a circle. Because of the double reflection, it could still measure an angle of 90d\*. In 1757, Campbell suggested that if you wanted to measure the angle between two celestial objects, such as the moon and the sun, it was desirable to have an instrument with a greater angle of action (Williams 98). That led to the creation of the sextant, whose frame was one-sixth of a circle, and which thus could measure an angle of 120d\*.

Subsequent improvements to the sextant included:

- silvered glass mirrors (the original ones were of speculum metal, and tarnished)
- larger mirrors (larger field of view)
- the tangent screw (to adjust the index arm)
- sun-shades
- vernier scales (and associated magnifiers)(EB11/Navigation)

- micrometer (for even finer adjustments)
- low-expansion frame material
- mountable monocular (for light amplification)
- spirit levels
- mountable artificial horizon

### ***Altitude Measurements on Land***

On land, the horizon may be hidden by mountains. Hence it is necessary to provide an artificial horizon. This took the form of a pool of mercury. Mercury, being a liquid, would naturally flow to form a horizontal surface. The observer would simultaneously sight on both the celestial object and its reflection; its altitude would be half the angle between them.

Use of mercury was not without its problems. Mercury is highly toxic and therefore had to be handled with care. Also, the artificial horizon could be disturbed by wind, smoke (from a fire 300 feet away), or ground vibrations (e.g., a horse galloping five hundred yards away). Topographers would dig a trench around the pan holding the mercury, to isolate it, and the observer would stand outside the trench. (Shafer)

### ***Altitude Measurements in the Air***

Pilots had a different set of problems. Because of the height of the aircraft, the observable horizon was far away (therefore often indistinct) and way below the geometric one (big dip correction needed). This also made it awkward to measure the angle between the horizon and the celestial object.

The mercury type artificial horizon was impractical because the surface would be continually perturbed by aircraft motion. Nor was it practical to use a damped pendulum to provide a reference vertical.

The basic solution, a bubble telescope attachment for a sextant, was developed in 1918 by R.W. Wilson. This was a shortened-T device. You looked, through a collimating lens, down the main tube, and thus at the horizon glass of the sextant. At the T-junction, there was a diagonal mirror, and this provided the observer with a view of a bubble in a bubble chamber at the end of the side tube. The bubble was confined by a spherical surface with a radius matching the focal length of the lens. The apparent position of the bubble told the navigator where the horizon was located.

The movement of the aircraft was still a problem, as the bubble took time to settle down. The bubble sextant was therefore refined by combining it with an averaging device of some kind. The averaging might be for a set number of observations, for a set time, or just between the "start" and "stop" of a trigger.

Navigators belatedly realized that the bubble position should be corrected for Coriolis acceleration; correction tables appeared in 1942. Williams (119) says that "in large stable jet aircraft flying on auto-pilot above the weather," the residual error after correction was about 2'.

I doubt that these bubble sextants are described in any of the books in Grantville. Jesse Wood may remember what they look like, and he may even own one, but bear in mind that celestial navigation for aerial use declined as early as the Sixties.

### ***Altitude Observational Errors***

The apparent position of a celestial object may differ from its true (geometric position) for a variety of reasons, some dependent on the observer and the instruments used, and others on atmospheric and astronomical phenomena.

*Sextant Construction Errors.* To have accurate measurements, you need accurate scales. Scales were initially made by hand and eye. Later, "dividing engines" were devised for accurately dividing a scale into its units. The Ramsden apparatus allowed the sextant to be halved in size, without loss of accuracy (Gurney 112).



*Sextant Calibration Errors* . The sextant must be re-calibrated on at least a daily basis, to check for and remove index error (the two mirror faces aren't parallel), side error (the horizon mirror not perpendicular to the plane of the sextant), and perpendicularity error (the index mirror not perpendicular to the plane of the sextant). Recalibration is necessary because the sextant is affected by changes in temperature and, of course, accidental knocks.

The sextant must of course be designed to allow these errors to be corrected. According to Togholt (30-1), the only error which can be tolerated (and taken into account in calculations) is index error, and then only if the error is less than 5'.

*Sextant Reading Errors* . The observer must take the reading when the image of the object is just "touching" the image of the horizon (the moon and stars can be difficult to "land" on the horizon properly) and the sextant is absolutely vertical. (Togholt 33, 91). A 2d\* error in "verticality" results in a 1.1' error in altitude (Manzari).

If the horizon is ill-defined, the altitude in turn is fuzzy. Usually, the stars and planets are observed during "civil twilight," when they aren't lost in solar glare but there is still a horizon. The best time is perhaps twenty minutes before sunrise, or after sunset (Schlereth 100-1).

*Dip* . Because the eye is elevated, and the earth is curved, the natural horizon (where the sea and sky meet) is lower than the celestial horizon. All sextant altitudes must be corrected for dip, or they will be over-estimated by several arc-minutes. The dip (') is about 1.06 times the square root of the eye level (feet).

The first dip correction table was constructed by Thomas Hariot (1560-1621), for eye levels of 5-40 feet; he figured the poop deck was at 20-25 feet, requiring a correction of 5-6'. His calculations are consistently about 1' too high. Wright's dip table was published in 1599. (Taylor 219-20).

*Refraction* . Light doesn't move in a straight line, but rather in the path which takes the least time. Since light moves more quickly

through warm air than cold air, and the air nearest the earth's surface is warmest, the light you see, unless it is from directly overhead, has taken a curved path, favoring the warm air, in order to reach your eye. As a result, it comes from an apparent direction which is lower than the true direction of the object which you are observing.

This effect is greatest when the object is low in the sky; indeed, you can see the sun even after it has set below the celestial horizon. In the Nautical Almanac, for a star on the horizon, the refraction correction is  $-34.5'$ ; at  $10d^*$  apparent altitude,  $-5.3'$ ; at  $45d^*$ ,  $-1'$ .

The Nautical Almanac assumes an air temperature of  $50d^*F$  and pressure of  $29.83"Hg$ . The refractivity of air changes if either temperature or pressure changes, but this needs to be taken into account only for low-altitude observations. In the subsidiary table, the maximum correction for unusual temperature or pressure, for apparent altitude on horizon, is  $-6.9'$ . Above  $8d^*$  apparent altitude, it's less than  $1'$  (Dutton 409-10).

The astronomer Tycho Brahe (1546-1601) published the first table of atmospheric refraction, determined by observation. He reported stellar refraction to be  $30'$  at the horizon,  $10'$  at  $5d^*$ ,  $3'$  at  $15d^*$ , and nonexistent from  $20d^*$  up. For the Sun, he was able to detect refraction only up to  $45d^*$ . (Heilbron 128)

Nonetheless, refraction tables didn't appear in nautical almanacs and weren't used by sailors. Hence, all low-altitude quadrant measurements at sea were subject to a systematic error.

The first theoretical model of atmospheric refraction was advanced by Cassini in 1666. It assumed that the atmosphere had a constant density up to a particular height, and then came to an abrupt halt. Cassini's model predicted that there was  $1'$  refraction of a star at an altitude of  $45d^*$ , contrary to Brahe's teachings. Cassini was right.

1911EB, "Refraction" teaches the refractive power of air is (1) nearly proportional to density (and thus varies with temperature and pressure) and (2) proportional, at moderate altitudes, to the tangent of the zenith distance ( $90d^*$ -altitude). The tangent law is the very one predicted by Cassini's model. (The 1911EB also says that near the zenith, the refraction is about  $1''$  for each degree of zenith distance, and, at the horizon, it is about  $34''$ .)

Cassini's model doesn't do a good job of predicting refraction at low elevations. For that, we will need to either develop a better model of the atmosphere (one taking into account how the atmosphere thins out), or simply determine refraction by observation.

*Aberration* . This phenomenon was identified by Bradley in 1729, so it isn't known to the down-timers. If the observer is moving away from the true line of sight to the star, the latter will appear to be displaced in the direction of the orbital motion. The principal source of aberration is the motion of the earth around the sun. The maximum displacement is  $20.5''$  (Pasachoff, 499). (The rotation of the earth can also cause aberration, but only, at most,  $0.33''$ .) (Williams 95).

*Parallax* . We use geocentric equatorial coordinates to describe the positions of celestial objects because they simplify calculations. However, a person on the earth's surface would see the sky from a slightly different angle than that of an imaginary observer at the center of a transparent earth. The angular separation of their lines-of-sight is called parallax. Lunar parallax was first measured by Hipparchus and is well known to seventeenth century astronomers.

The maximum lunar parallax occurs when the Moon is on the horizon, and it disappears when the Moon is at zenith. The parallax also varies with the distance of the Moon from the Earth, so that in the horizon case it is  $54-61'$ . Hence, if you are using the Moon for celestial navigation, you have to take parallax into account. The Sun is much further away, so its maximum parallax is  $0.15'$ . (Mixer 240).

*Semidiameter* . The stars and planets can be treated as point sources, but the Sun and Moon have discernible disks. To use the astronomical tables for the moon or sun, you need to know the altitude of the center of the body. However, you are actually measuring the altitude of the lower or upper limb. They are both about  $15.7'$  from the center, and vary as the distance to the moon or sun changes (by  $2'$  for the moon and  $0.6'$  for the sun). (Mixer 240). Harriot (1595) told Raleigh to use a correction factor of  $16'$  (Taylor 221).

*Augmentation*. The Moon is closer to the observer (by slightly more than the radius of the earth) when it is at zenith than when it is at the horizon, and hence looks larger, altering the semidiameter correction (Mixer, 242). At most, it is about  $0.29'$ .

### **Measuring Azimuth**

To measure azimuth (bearing), you use an azimuth compass. This instrument was first described in a 1514 Portuguese manual (Wakefield 40), and it combines a standard compass with an azimuth circle.



The azimuth circle, in its simplest form, is a ring with opposed sights, such as a peephole on one vane and a vertical wire on the other. The ring is turned until, looking through the peephole, the wire is directly in front of the object, and then you read off the orientation of the ring relative to the compass arrow.

That version only allows the navigator to take the bearing of an object close to the horizon, such as a landmark. However, there are more sophisticated forms in which a dark glass reflector is attached to the far vane, and is pivotable so that at an object at any altitude can be "brought down" to the horizon. (Dutton 177). A well designed azimuth circle will have leveling screws and "bubbles" so it can be made perfectly horizontal. Also, the near vane can be equipped with a telescopic sight.

The use of a simple "peep" system to observe the Sun would be hard on the eyes, and so the modern bearing circle comes with a second pair of "sights," a slit and a mirror on one end, and a prism on the other. The sunlight passes through the slit, and the prism creates a band of light on the compass card.

Celestial navigation usually makes more use of altitude than azimuth. That is probably because of issues of accuracy. Mixer (48) says that azimuths can be measured only to 0.5d\* in quiet water, 1d\* with the slightest roll, and 2d\* or more at sea.

### ***Measuring Time***

On shipboard, short time intervals were measured with a sandglass. A 28 second glass was used for logging speed and a half hour one for governing the ship's daily schedule (a bell was sounded every half hour).

The *nocturnal*, which looked something like a ping pong paddle with an extra moveable arm, was used to determine the orientation of the "Guard Stars" relative to the Pole Star, and thus (given the day and month) to find the local sidereal time. While it could only be used at night, and then only if the stars in question were visible (i.e., not in the Southern Hemisphere), it had an accuracy of perhaps fifteen minutes. (Swanick 108; Navigation/EB11).

There was also the *planisphere*, an example of which is depicted in Gunter's *The Description and Use of the Sector* (1623). The basic principle was that you set the date, matched the planisphere to what was observed in the sky, and read off the time. In the simplest form, the "sky" was represented rather abstractly by radial lines corresponding to various bright stars. The *volvelle* was rotated so the line of the star then on the meridian (due south if in the northern hemisphere) matched the date, then the observer looked up the time. There was also a pictorial type, with simplified constellations. (Turner 67).

The nocturnal and the planisphere could be combined into a single device. A "planispheric nocturnal" was taken from the wreck of the *LaBelle* (1686). It includes a planisphere with 27 constellations inscribed, some located in the southern celestial hemisphere. (Swanick 155-67).

Chronometers are used to determine the time at a point of known longitude (where the time was set), and the difference between local time and chronometer time is indicative of the local longitude. In Jules Verne's *Mysterious Island*, Harding reports when it is local noon (based on the length of a stick's shadow) and Gideon Spilett reads off the time on his watch (set to standard time in Washington). (Conveniently, the date of the observation was April 16, when standard and true time were identical.) I will discuss the use of chronometers in more detail in Part 2.

### ***Conclusion to Part 1***

Prudent seventeenth century sailors were mindful of the "four L's": Lead, Log, Latitude and Lookout. The Lead was the sounding line, which not only warned whether the ship was in danger of running aground, but also gave a clue as to its location if it was roaming familiar coastal waters. The common Log gave the ship's speed, and hence was essential for "dead reckoning" the movement since the last celestial observation. The Latitude, computed from observations with astrolabe, cross-staff, etc., helped fix the position. Finally, the Lookout was needed to spot hazards which either were not shown on the maps, or which were unsuspected because of faulty navigation.

The "Mariner's Creed" warned them that if they neglected any of the four L's, they would "some day surely perish" at sea.

Thanks to the books of Grantville, the sounding machine will one day replace the hand-thrown lead; the towed "patent log," the chip thrown overboard; and the sextant, the cross-staff and its ilk. For that matter, chronometers will replace nocturnals, magnetic compasses will be properly corrected, and twentieth century maps will be republished. But even with all of these improvements in navigational instruments, there will still be a need for a sharp-eyed sailor in the crow's nest.

**To be continued in *Grantville Gazette*, Volume 15**

**THE END**

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