

Grantville Gazette

Volume 16

edited by Paula Goodlett



*Hey Mom,
Minnie says I'd better not forget your Birthday, giggle.
Like I would! Love you and we'll be home soon.*

Denise

Art Director Garrett W. Vance

Grantville Gazette-Volume XVI

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Edited by Paula Goodlett

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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.

As it turned out, the first issue of the electronic magazine sold well enough to make continuing the magazine a financially self-sustaining operation. Since then, nine more volumes have been electronically published through the Baen Websubscriptions site. As well, *Grantville Gazette*,

Volume One was published in paperback in November of 2004. That has since been followed by hardcover editions of *Grantville Gazette*, Volumes Two and Three.

Then, two big steps:

First: The magazine had been paying semi-pro rates for the electronic edition, increasing to pro rates upon transition to paper, but one of Eric's goals had long been to increase payments to the authors. *Grantville Gazette*, Volume Eleven is the first volume to pay the authors professional rates.

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

The Anacond Project, Episode Five, Delayed

Written by Eric Flint

Folks, due to illness, Eric will be unable to complete Episode Five in time. We will be running Episode Five and Six in Grantville Gazette, Volume 17 and we will ensure that all members will be able to read it then, whether or not their membership has expired.

—The Grantville Gazette Editorial Board

Duty Calls

Written by Karen Bergstralh



March, 1634

The room was packed with villagers happy to see visitors and hear the latest news and gossip. Rob Clark, stretching his legs, found two young boys under the table. It seemed to him that every inch of space was crammed with people. Some youngsters sat the edge of an unfinished staircase, legs hanging, eyes and ears wide open. One boy, after losing his balance, had literally hung from the rafters.

It was a party and a feast with the villagers bringing out what food they had. The town mayor and his son-in-law squeezed through the door, each carrying a keg of beer. Rob and his friends had food presented to them from all quarters. Now, after three winters in the seventeenth century, Rob understood how little food must remain in the village larders. When Dieter Wiesskamp reached for his pack, Rob whispered, "Can we give 'em everything except what we need to get home?" Dieter nodded and began emptying his pack. Sausages hit the tabletop and were followed by a sack of rutabagas and carrots.

When Dieter hauled out the two slabs of bacon Wilf Jones winced. With the bacon gone the group's rations were down to a couple of slabs of salt pork and a handful of sausages. Rob smiled back and mouthed 'Hearts and Minds' at Wilf. That got him a grimace in return. Reichard Blucher smiled from the far end of the table, obviously distracted by the two young women hovering over him.

Rob realized that Wilf had been right to insist that they not wear their militia uniforms or tell anyone what their real purpose was. This area was just regaining population and rebuilding the villages. These people had little reason to trust any military—both sides had pillaged them and burned their villages while foraging.



"We're a small party," Wilf had stated. "If we go up there in uniform we're more likely to wake up one morning with our throats slit than find the bandits Major Stieff wants us to look for. Best go as a simple group of horse traders checking out the market for our stock. Naturally we're interested in any rumors about robbers."

The previous fall a Grange-sponsored group came up here to help the villages with their harvest. Rob had come with them. The army platoon that came along to guard the machines had been forced to camp outside the villages. Even those of the soldiers who joined in the heavy labor had been greeted with silence and suspicion.

Rob reached into his pack and took out a Walkman radio. He brought out a pair of battery driven speakers and plugged them in. When Wilf nodded Rob turned the radio on and found the Voice of Luther radio station. The party went from raucous to solemn as he dialed in the broadcast. It was the Vespers service from Madgeburg cathedral. Scratchy and static-filled, as it was, the choir's "Glory be to the Father and to the Son and to the Holy Ghost"

filled the room. Pastor Borstorf nodded thoughtfully; stroking his chin and mustache while the service rolled on. The miracle of hearing what was being said and sung in that distant city even quieted the children. When the Benediction and the last "Amen" had been said, the villagers slipped out into the cold to their houses and bed. Pastor Borstorf remained behind.

"Many thanks, Herren, many thanks for that. It was fifteen years ago when I last heard that choir. Perhaps, should this year's harvests be good, it may be that the village can afford such a machine. Of course, Herr Bishoff has his eyes on one of the new manure spreaders and so it may come to making a choice between the practical and the uplifting." With a sly grin the pastor added, "I may vote for the manure spreader myself to save my sermons being compared to those from the cathedral."

"Ah, but Pastor, *you* know it was little Hans that threw his sister's doll in the well and Old Klaus who drinks too much . . ." Dieter teased gently.

"Oh, yes! I know my flock well enough." Pastor Borstorf grew grave, his voice dropping to a near whisper. "You go to Oberschwartzwald next, don't you?"

"Yes, that is our plan," Wilf replied as softly.

"Do not play your radio for them, especially not a Lutheran service," Borstorf whispered grimly.

"Are they papists, then? I'd not thought around here . . ." Wilf asked.

"Heretics! Would that they were only deluded papists. No, those left in Oberschwartzwald have corrupted Christ's teachings beyond even the papists' heresies. Beware your souls in such a place. At least the Good Lord has seen that those sons of Satan do not prosper. Would that He removed them from the face of the Earth. We would be well done with Groenwald and his thieving 'cousins.'"

"We've heard others complain about thieves . . . are the men from Oberschwartzwald the ones who have committed these thefts?" Wilf asked.

"They've stolen anything that wasn't chained down or held in hand. Three sows, a horse, and two cows in the last month have wandered off toward the Devil's village. Frau Weltz' freshly-washed blankets and the Donner's two casks of sauerkraut walked off with the animals. Others have lost tools. My own good ax went from the chapel entrance."

The pastor's pained look reminded Rob of how precious the stolen items were to the villagers. It prompted him to ask, "You said something about Herr Groenwald's cousins? I take it you think they are the thieves?"

"Young man, for centuries my family and the Groenwald family have known each other and yet none have ever heard of these cousins nor their supposed ancestors. Devils in disguise they may well be, visited on Groenwald for his heresy. Keep good watch at night."

The Grantville quartet exchanged glances. Rob felt a twinge of conscience. His first feeling had been one of glee. If these strangers in Oberschwartzwald were their bandits, he and his friends might be on their way home in a day or two.

* * *



Yesterday's snowstorm had turned to sleet around dusk. Just past midnight the wind slackened, the temperature dropped, and the sleet turned to ice. As the sun rose over the hills the village took the appearance of a landscape carved from ice. Sunbeams danced from icicle to icicle, shimmering brightly.

The beauty of the scene was lost to the men huddled around the small fire. The room that had been stuffy and over-warm last night now was frigid. The walls and roof had kept them dry but the wind found every crack.

"What curse follows us that the very weather turns against us?" murmured Reichard as he delicately added a small branch to the fire. "As cold as it is, it's well Christian didn't come with us. "

"Yeah, two weeks riding in snow and sleet after recovering from pneumonia isn't too smart," Rob agreed. He missed the lanky man and his acerbic wit.

"Come, now, Reichard. It isn't that bad. At least it isn't sleeting anymore," Wilf teased. "And look there, our young friend Rob seems as comfortable as can be."

Rob, shivering on the other side of the fire took one hand out of his pocket long enough to give Wilf a single-digit salute. "Yeah, just like I'm at home in front of my own fireplace. All that's missing is the popcorn and beer." Despite his up-time parka, fur lined pants, and heavy boots Rob was cold—down to the bone cold. He wondered again how the others managed. Wilf was wearing an old faded-blue parka neatly patched at the elbows and too long in the sleeves. The parka had once belonged to one of Rob's older brothers. Under the parka Wilf wore a wool shirt, wool pants and a pair of western style boots. His hands sported a pair of rabbit skin gloves. To Rob's eyes the oddest part of the older man's ensemble was the plaid wool scarf tied around his head. Dieter was similarly attired, save his parka was newer, bright orange, and fit him better. Reichard, as big as he was, hadn't found an up-time parka that fit him. Instead the man wore a sheepskin jacket that left Rob idly wondering how many sheep had died to make it. All of the men wore Stetsons. Somehow the sight made Rob think of a Saturday Night Live take-off on *Bonanza*. Wilf would be cast as Papa Cartwright, Dieter as the smooth-talking Adam, and Reichard, of course, as the oversized Hoss. That left Rob himself as Little Joe. The thought tickled him and he found himself laughing.

"Ah, now you prove my point. You *are* just as comfortable here as at home." Wilf grinned back at him.

"More so, I think," Dieter chimed in. "Here he doesn't have to listen to all the women chattering."

"Aye, or get dragged off to see the tailor 'just one more time'. Frau O'Reilly is a level headed, practical woman, or so I thought." Dieter shook his head mournfully. "Now, with your wedding at hand, she has gone as mad as the rest."

"Come now, Dieter." Wilf chuckled. "I'd say that 'tis Liz and JoAnn who are wildest about the wedding. Frau O'Reilly's daughters, too. If anyone gives Frau O'Reilly trouble it is her girls. Fraulein Lannie, she stays calm."

"Well, yes . . ." Rob replied. "Grandpa Ev has been running interference for us. He's declared his house a 'wedding free zone.' Even JoAnn shuts up when he reminds her that it's not *her* wedding. The trouble starts when they get to my house and run into their cousins . . ." He drifted off in memory, then

heaved a sigh and grinned back at the other men. "Lannie and I have talked about eloping, except there's no Las Vegas to run to."

Rob tossed a burning branch back on the fire. The guys had it right; he'd come along because he couldn't deal with any more wedding plans, wedding talk, wedding decorations, or sly digs about the wedding night. A week after Christmas, Maggie O'Reilly moved into the housekeeper's quarters in Rob's house. She'd rented out her own house to Christian du Champ and his family. Rob had been in favor of the move as it meant that he got Mrs. O'Reilly's cooking for all his meals. However, he also got the three O'Reilly girls—and their enthusiasms over his upcoming wedding.

Over the last two years he'd had trouble getting used to being alone. Having the O'Reillys in the house helped and in less than month things would change again. He would officially be a part of a family. A large, noisy, boisterous, alive family.

"Yeah," Rob answered, keeping his eyes down so the others wouldn't see the hint of tears in his eyes. "Yeah, I came along to get away from all the wedding craziness. Besides, someone's got to keep you guys out of trouble." Ducking, Rob almost avoided Dieter's rolled up sleeping bag.

"We need to eat and get moving. Oberschwartzwald is just a couple of miles up the road. Even if there are no bandits it is the last village on our list," Reichard announced. He picked up the frying pan and offered it around. "From what the pastor said it sounds like our bandits might be in residence there."

"Aye, we'd better move or we'll freeze our asses off. Until last night Major Stieff's 'odd stories about bandits' from the villages out here appeared to be no more than noises in the night," Dieter commented while eagerly spearing a piece of meat from the pan.

"Well, the good major did say he didn't think there was much to them. Just that he wanted us to check them out. All that we've heard about in the other villages were a missing cow here, a couple of sacks of onions gone there, a horse that didn't come in from the pasture, and so on. But the pastor's concerns about Oberschwartzwald also make me think there is something more to the stories than random chance and the odd thief," came Wilf's calm reply. He, too, readily speared his share of meat from the pan.

"Don't forget the missing girl," Reichard said. "I don't think she just wandered off on her own to admire the snowdrifts. That scared boy two villages back said he saw four or five riders trying not to be noticed. These mysteriously appearing relatives could be deserters. The Good Lord knows

there are enough of them wandering about. The tracks we saw the other day, they looked like five ridden horses and they were heading toward Oberschwartzwald." He extended the frying pan to Rob.

Rob flipped open his Buck knife and gingerly speared the smallest piece. Fried salt pork was one down-time food he didn't like.

"We'll check out the village, spend tonight under cover, and head home tomorrow. If we push and the weather holds we'll be back in Grantville by Wednesday." Reichard's share of the fried salt pork disappeared in two large bites and he continued, "We can report to Major Stieff and be done with our militia duty for another year." A broad grin split the big man's face.

* * *

The men exchanged puzzled looks. They were just coming into the village of Oberschwartzwald, past a pair of half-ruined barns. Ahead they could hear a man yelling.

"Sounds like someone is calling someone else a 'dirty little thief,'" commented Dieter.

"Aye, and I think I know that voice," Reichard said. "If it is him, he dies today." Suiting actions to words the big man reached down and pulled his rifle from its scabbard.

"Yes, and any of the mangy crew he runs with," Wilf added in agreement as he also readied his rifle. "That pastor last night had the right of it—devils in disguise."

"Who are you talking about? Do you think these are the thieves Major Stieff was worried about?" Rob asked in confusion. He reached under his coat for his own revolver.

"Stay out of the line of fire, Rob. This is old business—dangerous business," a grim-faced Wilf warned. "Not your business nor that of Grantville . . ."

"It's old mercenary business, Rob, with as bloody-handed a mercenary as you'd find. Made the Spaniard look like a saint." Even Dieter, usually smiling and laughing, had a grim look. "The tracks said five men."

"Don't assume that's all. This place may hold others. Spread out. We don't want to give anyone a massed target." Wilf grinned, his face looking wolf-like. "Against wheel locks or snaphances we've a good chance. Pray they've not gotten their hands on up-time weapons. Rob, your eyes are good, watch the upper stories and our backs. "

Rob nodded in agreement and started to turn his horse around. Art Deco, the Spanish stallion Rob was riding, quivered and refused to turn. Shoving

his revolver into a coat pocket, he reached down to stroke the stallion's neck. "Easy, Deco, easy fellow."

The shouting was coming closer and now Rob could hear hoof beats on cobbles. Deco suddenly rocked back on his haunches and rose into a levade. Rob took both sets of reins in his hands, automatically separating curb and snaffle reins. He took a solid hold on the snaffle as Art Deco's forefeet landed and the horse arched his neck with a snort. "Hey, silly, ease off," he told the horse and again turned him; thankful that he had the pelham on the stallion instead of the plain snaffle he usually rode with. With the stallion this restive the curb would come in handy.

"Get a good hold, Rob. That's a warhorse. When the fight starts he'll be ready to move fast—very fast." Wilf started forward into the village square.

Rob managed to hold the stallion back until the rest of the group had cleared the road. He eased up on the bit. A pair of prancing steps brought horse and rider far enough forward to see what was happening.

In the open area a mounted man was chasing a small boy around the well. The child darted frantically back and forth while the horseman cursed and threatened to trample him. A couple of men standing in a doorway yelled bets back and forth on how long the boy would live after the 'captain' caught him. Two other men were restraining a woman against the wall of a house.

When Rob leaned forward to see better, the stallion grabbed the bit and leapt out, hitting a full gallop on the third stride. Without veering the warhorse ran at the other horseman. Rob sawed on the reins and finally managed to put Deco into a sliding stop, somehow ending up next to the child. Rob leaned down and scooped the boy up. He tried to spin the stallion away, thinking to dodge back the way he'd come. Instead, Deco spun to face the other horseman. Rob managed, barely, to stay on.

His game spoiled, the horseman spurred straight at Rob, his hand fighting with his bulky cloak to reach his saber. Deco leapt forward again, colliding with the other horse. The lighter mount went down.

The downed horseman screamed, "You bastard! You'll die a long, painful death for this!"



Rob recognized several shots from at least two up-time rifles and the boom of a wheel lock. His attention was focused on the horse under him. Deco didn't quiver with excitement now—he radiated rage. The stallion half-reared and smashed his hooves down at the fallen horseman. None of Rob's efforts to control him made it past Deco's pinned ears.

The stallion screamed, high-pitched and eerie, his head snaked forward and grabbed the downed man's face. The crack of splintering bone followed. The fallen horse struggled, blocking Deco from his prey and the stallion stepped back a pace.

Rob slid off and, still clutching the child, stumbled backward until a wall stopped him. He set the child down behind him and turned back to watch the monster that two minutes before had been his favorite horse.

Deco's backward steps gave the other horse room enough to stand and limp off. The rider lay unmoving, his face an unrecognizable mass of raw flesh and blood. Rob was certain that the man was dead. The stallion circled the body, his nose nearly touching it, sniffing and snorting. Then Deco squealed, reared again and brought both front hooves down on the body. Again and again the horse reared and brought those steel shod hooves down, trampling the body.

Movement on Rob's left resolved into a man with a sword and pistol. Rob ducked away from the sword and pulled his revolver from his pocket. He danced far enough away to bring the revolver up and fire a quick shot. The attacker hesitated, dropped his sword and pointed his pistol at Rob. Rob took aim and squeezed off another shot. The wheel-lock pistol in his attacker's hand wavered and dropped, followed by the man's body. Belatedly Rob remembered to check for other bandits.

Against the wall, where the woman had been held, two bodies lay crumpled. Another body convulsed in a doorway. Rob heard Reichard yell "Clear!" off to his right and Wilf's reply from the left. Dieter's voice seemed to come from the house with the open door. The man Rob had shot gave a sighing groan and was still. Blood was everywhere—a shocking red highlight to the brilliant white snow. After one last check for other bandits, Rob turned, dropped to his knees, and lost his breakfast.

"Are you hurt, lad?"

Rob looked up to find Reichard standing over him. "No, I'm okay. But Deco . . . God, Reichard, I've got to shoot him! He's gone nuts!"

"Ah, lad, no. He's a warhorse, doing what warhorses are taught to do. Now, if horses have souls I might worry that Deco is enjoying his revenge a bit too much." The element of satisfaction in Reichard's voice caught Rob's attention.

"Revenge?" Climbing to his feet, Rob made himself look again at the stallion and the bloody bundle of rags under the horse's hooves.

"Few of your horse's scars came from battle. That miserable excuse for a man . . ." He sneered, pointing to the body Deco was still pounding. ". . . put the rest there with spur and whip. Especially the whip." Reichard spat and continued. "I, for one, would say this is a fitting end to Captain von Schor."

"Aye, and he had no right to either the 'von' or the 'captain,'" Wilf said as he approached. A look of satisfaction spread across his face. "It was just the five of them. Old Jacob's still alive, for now at least. Dieter is with him so he may not last long. Joachem and Pigears had the boy's mother. They'll not bother anyone again."

Struggling to hold himself upright and steady, Rob mechanically reloaded his revolver. He looked around and saw a few heads peering out of doorways and windows. "I reckon we've saved the town from the outlaws, Marshall," he drawled in English.

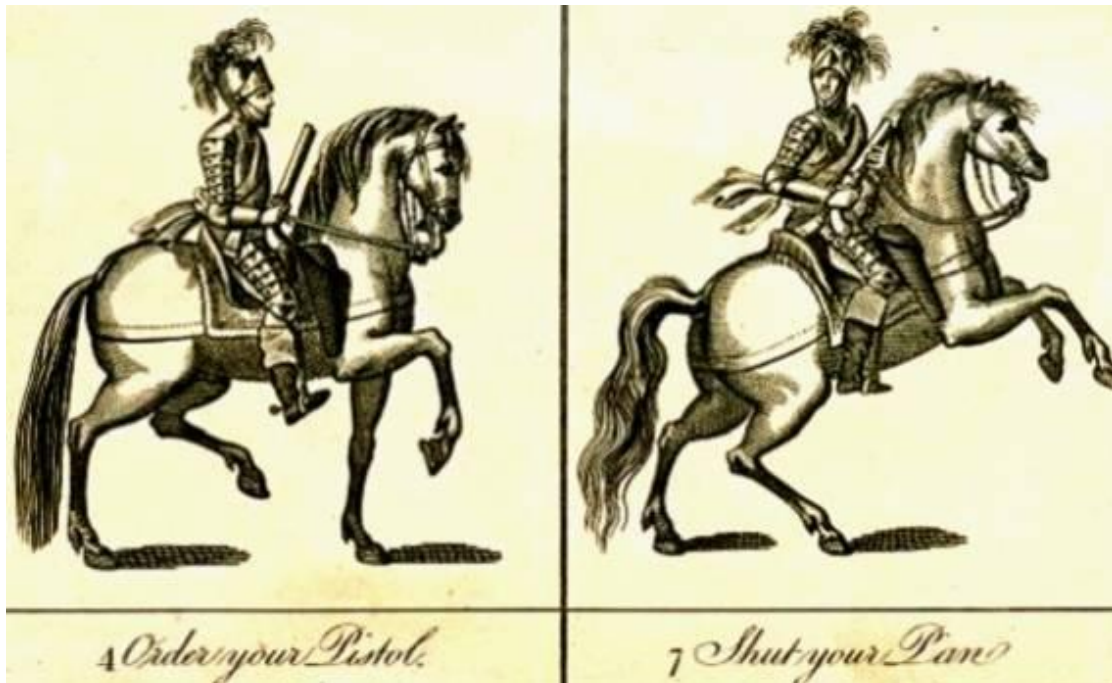
Both Reichard and Wilf laughed. Most Saturday nights found the former mercenaries at Rob's house watching old movies. Westerns were their favorites. The movies were generally accompanied by cackles of laughter and loud exclamations of the number of ways various villains and heroes would have died in a real battle.

Wilf added thoughtfully, "Watch yourselves with the villagers. I don't think we've earned ourselves any welcome here. To them we are just another set of armed scum. Be careful of catching a knife in your backs."

"Or a shot from across the square," Reichard added.

"Maybe not. From the quick glance I got, the village's guns are all in the house these swine were using." Wilf grimaced. "I suppose we'll have to play nice and give them back."

That brought Rob's mind around again to the stallion snorting and pawing in front of them. "Wilf, I've got to put Deco down—before he turns on someone else."



"What? No, Rob, just wait. Once the horse is certain his torturer is well and truly dead, he'll calm down. No need to destroy such a magnificent warhorse. That bastard Schor taught him too well. And Schor knew it. That's why he sold Deco off. Now the horse has found his old master and taught him a lesson." Wilf's laugh was as satisfied as Reichard's had been earlier.

* * *

"Are we going to have any kind of legal hassles over killing these guys?" Rob asked. His head was still full of sounds and sights from the brief fight and his hands shook slightly. He carefully cleaned each part of his disassembled revolver. Beside him sat his rifle, ready and easily at hand.

Wilf had "played nice" and returned the villagers' guns to the villagers. But he had first separated powder and shot from the weapons and handed those over only after all the guns had been claimed. Rob fully understood the earlier warning about watching his back after that little exchange. The looks the villagers gave the Grantvillers made it clear that there would be no thanks. Wilf didn't think the villagers would openly attack them but everyone had weapons at hand just in case.

"I don't think so. Each of them were on the old Grantville 'Kill if found' list. I doubt that anyone from our present government will complain," Wilf replied as he patiently and thoroughly cleaned his rifle. "These black powder reloads work well save for the mess they leave."

"The ones who have to bury them might complain," Dieter joked. "The ground is still frozen." He was cleaning out several deep scratches and

scrapes on the boy Rob had rescued. The boy's mother, Marta Altboters, sat holding him on her lap. Her bruised face was stolid but her blackened eyes darted from man to man.

Reichard sat to one side, his attention on the doorway and Rob's extra pump shotgun across his knees. "We've done the world a service this day by ridding it of those scum. *Faw!* Look at this place! I swear it looks like a pig was slaughtered in here."

"No, not a pig . . ." Marta sobbed softly. She looked around fearfully and clasped Mattias tightly.

"Come, now, Frau Altboters." Dieter smiled warmly at mother and child. "We'll not harm you. No need to hold your son so tight. He's been a good boy and not fussed or squirmed. I'm almost finished with him."

Wilf was looking at the young mother, an odd expression on his face. Reichard began to curse under his breath. Rob smiled at her, trying for "trust me" and fearing he looked instead like he was sneering. "None of us will harm you. You and your boy are safe with us. As safe as in your father's house." Her reaction surprised him.



"Safe as my father's house, eh! My father—" She spat into the fire. "—was the one who shoved me in here to keep you satisfied and away from the other women."

"Ah, that explains it. I thought he said something about sacrificing. He's made you the sacrifice. Your son, too, were we that sort of men." Wilf shook his head and frowned. "Whether you believe it or not we will not harm you or your son in any way, Frau. Perhaps we should introduce ourselves. I am

Wilfram Jones, a reasonably respectable horse dealer from Grantville. The overly-large man concerned with the former tenants' housekeeping is Reichard Blucher. He is a partner of mine, as is Dieter Wiesskamp. Dieter acts as our surgeon as needed and is very good at it. Lastly, this young man is Robert Clark, horse breeder, trainer, and good friend. He has eyes and thoughts only for his betrothed back in Grantville."

"Aye, Rob's thoughts won't stray—he knows what his Lannie would do to him if they did!" Dieter jibed.

"Come on, Dieter!" Rob found himself blushing.

It might have been the blush or maybe the polite nods from each of the men that took the wild fright out of Marta's eyes. She looked down at her son and lightly fingered each bandage. Finally her head came up and she stared at the men. "What manner of men are you?"

"Not the likes of Schor and his gang," Wilf bit off. "You said something . . . I'm half-afraid of the answer . . . You said 'No, not a pig.'"

"A girl. About twelve or so. They brought her here a week ago. When they were done with her they had me take the body out."

Reichard spit out one last long and vehement curse. "Pigears liked them young. He died too fast. I should have ripped his balls off." Reichard eyed the woman. "They've been bashing you around, too, haven't they? Bastards!"

Marta nodded and sobbed out, "Yes. Father handed me over to them when the woman they brought with them disappeared."

"And your husband didn't object," Rob asked.

"How could he? He's been dead this last three years."

"The women disappeared as in 'under a convenient snowbank'?" Wilf asked. "Oh, woman, what kind of monster is your father to do such a thing?" His hand gently brushed her loose hair back, exposing a large, raw abrasion on her jaw. "These wounds need to be cleaned out or they will fester. Will you allow Dieter attend to them?"

She looked around at all of them then slowly nodded. Leaning down she whispered something to her son and he slid off her lap. Rob motioned the boy over. "Let's get something on you, Matthias, before you freeze." Rob reached into his pack and pulled out first a flannel shirt and then a tee shirt. Grinning he tossed the tee to Matthias. "Put this on." The boy smiled shyly back and pulled the tee-shirt over his head. The result brought smiles to other men as Matthias stood draped from neck to toes in the black shirt with gold lettering. "Here, wrap yourself up in this shirt and slide down inside my sleeping bag." Rob handed the flannel shirt to the boy.

Matthias wound the flannel shirt twice around himself and, with a few anxious looks at his mother, wiggled down into the sleeping bag. Seeing the boy settled down gave Rob a warm feeling and he turned back to cleaning his revolver. Wilf hummed to himself as he reassembled his rifle. With a final click he slipped the clip in place and carefully set the rifle aside. Rob looked up. He realized that the tension in the little house had lifted a bit.

"Frau Altboters, did von Schor or any of the others every talk about why they were here in Oberschwartzwald?" Wilf asked suddenly. "This village seems an unlikely place for them to spend any time."

"No, they didn't talk—they argued. Constantly. The one called Jacob was always complaining about staying here. The captain hit the one called Pigears over the head with a chunk of firewood once. He kept saying that they would stay until they had finished their job. Until the job was done they wouldn't get paid." Marta winced as Dieter swabbed out an abrasion.

"Ah, now that sounds like our late and unlamented acquaintances!" rumbled Reichard. "Money, or at least the chance for money, was all that mattered to that crew."

"Aye, but money for what? Who was paying? Mayhap we should have tried to keep old Jakob alive a bit longer," Wilf replied. "As is we have an answer to Major Stieff's puzzle. We know who and how many 'bandits' were causing trouble. However, I'm certain he'll want us to find the answer to this new puzzle."

Rob nodded. A thought struck him. "Frau, did you ever see or hear talk about their paymaster? How did he contact them?"

Marta Altboters sat silently for a few moments. Rob thought he saw fear cross her face. After a long look down at her sleeping son, she grasped Dieter's hand and pushed it away. "There was a man they spoke of. A man who met them outside of town, on the other side of the woodlot. When they came back from that meeting Schor had a satchel. He hid it behind the bed." There was a sly, defiant look on her face as she spoke the last. She looked around at all of them as if waiting for blows to fall.

"Oh! Clever woman! I bet that those swine never thought of you beyond their dinners and the bed! Stupid of them." Wilf bowed to Marta. "Gallant woman. Your trust in us is well founded." He looked around the room. "Rob," he commanded quietly, "take the shotgun and guard position."

Rob nearly tipped his stool over in his haste to comply. He thought he knew what was coming. Reichard grinned, arose, and handed over the shotgun.

"You worry about the door, we'll worry about keeping out of you line of fire," Reichard said, a wide grin on his face.

Rob in the chair, keeping the shotgun pointed at the door. The first time he'd gone horse-trading with Wilf and the others he'd considered a barred door and shutters sufficient safety precautions. Now he found comfort in Wilf's paranoia as expressed by the shotgun and the unobstructed line of fire. The shutters could be pried open from the outside but it would take time, make noise, and neither window was big enough for a man to slip through. As well, Reichard had driven nails through the shutters and it would take a sledgehammer or ax to open them. The chair he sat in was carefully placed. Should someone break down the door the intruder would find the shotgun on his unprotected side. Also, a gun stuck through either of the windows would be hard put to line up on the chair.

The table sat in front of the door, just close enough that a group of men trying to force their way through the door would be stopped by it. On one side the door's swing would be stopped by a large trunk, on the other side sat the shotgun and guard. Up in Poland the previous year there had been a band of men who had decided to relieve the horse traders of their gold. Five of the thieves died before getting off a single shot and the sixth managed only to put his shot into the thatching. There had been no further trouble with thieves on that trip.

"Shall I?" Reichard's voice rumbled as he stood beside the bed.

"Aye, pull it out and while you're at it get rid of those bloody blankets," Wilf directed. "Might as well chuck the mattress out, too. I'm not so fond of lice any more. Especially not lice who've been dining on Schor and his band."

Reichard grabbed the bed frame and pulled it away from the walls. He reached down and produced a leather satchel of the kind the Thurn and Taxis post riders used. It landed on the table with a solid thunk. Reichard turned back to the bed, and gathered the blankets and straw stuffed mattress into one large bundle. He carefully stepped around the table and waited while Wilf snuffed the candles and opened the door. A quick step outside, a heave and the filthy mess disappeared into the night. Another step, back this time, and Reichard was inside and the door closed. The bar dropped into place.

Wilf lit the candles, then grinned and drew the satchel toward him. "Mayhap now we'll see what Schor was up to." Papers spilled out, several letters and two large vellum rolls when he unpeeled the satchel. There was a single clink announcing the presence of a large silver coin. Wilf held the coin

up and showed it around. It was only half a coin with a jagged edge. Wilf set it aside and started scanning the letters.

"Reichard, as you've finished with the bed take over guard again. Most of these are in French." Wilf indicated the letters on the table. "Here, Rob, you read French. See what you make of this."

The exchange was quickly made and Rob sat again at the table. After squinting at the first letter in the candlelight he grabbed up his pack and unzipped a side pocket. The small battery-powered lamp lit up the interior of the house remarkably. Behind him he heard Marta gasp but his attention was on the letter. What he read made him reach for the rolls. "Maps, that's what this is about. Maps of the roads around here and on up toward Magdeburg" Rob unrolled one vellum and held it open. Wilf and Dieter crowded around.

"Maps with notes on roads, road conditions, fords, and military patrols." Wilf's voice was tight.

"Here and here, notes about the villages—supplies of food, livestock numbers, details about the town militias, how many guns, how much gunpowder and shot . . . Just what a raiding party needs to move quickly." Dieter's face was grim. "Or is it to be more than a raiding party?"

Rob scanned two more of the letters. "I can't tell. Some kind of raiding party. That's my guess from the information asked for—the letters don't say. Nor do they give a time. From what you've said the fact that they are in French doesn't tell us anything, either."

"No," Wilf replied. "Schor read French but none of the others did so it could just be his way of keeping them ignorant. He wasn't the most trusting soul." Pausing, Wilf looked around the room. "I think that this package belongs on Major Stieff's desk as soon as possible. Moonrise should be late tonight but the road is clear. We'll leave before it's up. Two hours, men. Rest and eat."

"My son and I will go with you." Marta's voice was firm, her chin was up and from the look on her face she was expecting to fight for her decision.

Reichard chuckled. "The lass has more spine than her father. Certainly you can come along. I'll don't think any of us want to leave you to be 'sacrificed' again."

"Aye, Reichard," Wilf declared flatly. He looked at her for a moment and then nodded. "Right. By rights Schor and his band's horses are yours. They aren't much but selling them and their tack in Grantville will give you some money. There are several places you can stay—safe places." He stared into the candle flames for a moment and continued. "Reichard and I will ride

with you. Dieter and Rob, you two will take the satchel along to Major Stieff as quickly as you safely can."

"You will not need to wait on us. I can ride as well as any man." The voice was proud but wavered a little at the end. Marta stood and began rummaging through a pile of clothing on a bench. She pulled out a man's shirt and a pair of long trousers that were obviously much too large.

"Frau Altboters, I have no doubt about that. The fact is that Dieter and Rob are light riders and have the two fastest horses amongst us. They will make the trip quicker and I confess that I'm getting too old for the kind of breakneck riding those two delight in. We four will follow at a slower pace. Rob, I'd like to keep your sleeping bag with me—for the boy and his mother." A smile played across Wilf's face as he looked down at the sleeping child.



"Sure, Wilf. There's an extra pair of jeans in my pack that should fit you, Frau Altboters, and some socks. My extra boots are probably too big . . ." Rob grabbed his pack and dug out the promised items. His mind was busily

planning how to make the fastest time back to Grantville. A stray thought bubbled up and he glanced at Wilf. What was the man up to? Wilf was usually the one who set a fast pace. He glanced at Reichard and when their eyes met Reichard winked slowly and tilted his head toward Wilf. Wilf was speaking softly to Marta Altboters while helping her find a warm cloak.

"Well," muttered Rob under his breath, "this should be interesting. The man who is impervious to women's charms . . ."

"Looks to have found a winter rose," Reichard whispered softly.

* * *

Major Stieff settled back in his chair. The wondrous warmth of central heating rapidly thawed his frigid feet and hands. The mug of coffee and three of Frau O'Reilly's oatmeal cookies served to warm his insides as well. One of the other men seated in the room coughed and that brought Stieff back to the reason he'd ridden out to the Clark house.

"Don Francisco has your maps and letters. He's set his people puzzling over them. So far the conclusions are that your bandits might have been working for Turenne. Given the number of factions interested in military information in that area the number possible 'paymasters' is quite large. Still, I was asked to pass on thanks to you. First for removing Schor and his friends, second for recognizing that he must have had a compelling reason to stay in the Oberschwartzwald area, and third for bringing the maps and letters back so promptly." Stieff sipped his coffee and nibbled on a cookie, enjoying the moment.

"We accept Don Francisco's thanks," Wilf answered. "There's more, isn't there?"

"Ah, yes." Stieff smiled. "One of the up-time sayings I find so charming is 'No good deed goes unpunished.' It sums up life's little quirks so nicely."

"So, Major, what will be our punishment?" Reichard asked.

"Nothing specific at this time." Stieff paused. "However, I did get the impression that Don Francisco may have the odd job for you from time to time. Not," he added hastily, "before Rob's wedding. Definitely not."

"So Don Francisco is afraid of Fraulein Lannie's temper, too?" Dieter laughed.

"More likely of Herr Parker's. He would not like to see his granddaughter's big day spoiled."

Major Stieff decided to take his leave on that light note.

E. Coli: A Tale of Redemption

Written by Terry Howard



Ken paused in front of Jimmy Dick barely long enough to say, "Incoming," before moving down the bar and taking shelter in the back room. Jimmy glanced in the mirror to see his ex-wife, Bina Rae, framed by the early afternoon sun, walking toward him from the slowly closing door of the otherwise empty bar.

"James, I sent you a letter. You didn't answer it."

Jimmy didn't say anything.

"I went down to Genucci's and made the arrangements. Everything will be out of the way when the time comes. You need to stop in and pay for it."

Their only child, Merle, had brittle bones. Jimmy had been exposed to Agent Orange in Vietnam. When the baby was diagnosed, the pediatrician told her Jimmy's exposure might be the reason why. He came home from working overtime to find his wife had taken his daughter and moved out. She blamed him for the baby's condition.

The court gave him visitation rights along with the child support payments but it never worked out. There was always some conflicting schedule or a big fight, or both. Merle eventually ended up in assisted living and Veteran's Affairs paid the bills. Jimmy had tried to visit her in the home after she moved in, but Merle made it clear she didn't want to see him. This was, pretty much, his entire contact with his ex-wife and child.

Now, the home was telling Bina that Merle wouldn't last much longer. So Bina made arrangements with the funeral home.

"Aren't you going to say anything, James?"

"Have a beer."

Her voice was scornful, "You drink too much. It's bad for you. You never did take care of yourself."

"Back up time, before we left, in a number of carefully controlled studies, it was determined that if a person drank a half gallon of water each day, at the end of the year they would have absorbed more than half a pound of E. coli. In other words, when you drink water you're drinking shit.



"However, if you drink whiskey or beer or any other liquor, you're safe because alcohol has to go through a purification process of fermentation.

"So you've got a choice. You can drink beer and talk stupid or you can drink water and be full of shit."

Her voice dripped with disgust. "What did I ever see in you?"

"A good living?"

"Stop down to the funeral home and pay the bill, Jimmy." With that, she walked out of his life, again.

"Ken," Jimmy Dick said softly, "whiskey, and leave the bottle."

* * *

A few weeks later Genucci's Funeral Home opened up the overflow area and then put out extra chairs for Merle's funeral. They had been told to expect a small turnout. After all, Merle had spent half of her life in assisted living, her father's family never visited, she had no friends outside of the home and her friends from the home would not be attending. Her mother's family, her mother and three adopted children were all the guests they were told to expect.

"Merle's father will pay for things. He will not be attending," Bina Rae told Freddy when she made the arrangements.

When Jimmy stopped in Freddy asked, "Bina Rae says you won't be attending?"

"Bina . . ." Jimmy was trying to be polite so did not pronounce it Bi'tch'na as he normally did. "Does not know what she is talking about. Again, as usual."

Freddy concluded that separate seating would be in order. The family area in many funeral homes is often at right angles to the general seating. This provides privacy to the bereaved. Providentially, the converted dwelling he ran the funeral business out of just worked out that way. When the time came, he would seat Jimmy in the general seating area, out of sight of the family.

While not many people were familiar with Merle, a lot of people knew Jimmy Dick. Many of them knew him as 'Dick Head,' a name even Jimmy would admit to being fully deserved on the rare occasions he was fully sober. Yet, somehow they managed to respect him. And while he never talked about it, Grantville was a small town where your business was everybody's. They knew the story. They felt he got a raw deal and were inclined to be supportive.

"You goin' to Merle's funeral?" was a question frequently asked at Club 250.

"Yeah. I didn't know her but this is going to be hard on Jimmy. He's bought me a beer anytime I was broke, figure I owe him." This was a common point of view. Normally people figured they'd paid for any beer Jimmy bought by putting up with his usually rude and shrewdly critical wit while they drank with him. Still, a funeral is different.

Then there were the down-time Anabaptists, who met in Club 250 on Sunday mornings until the cops started asking questions about them causing trouble. This was all the excuse Ken needed to throw them out. Complaints had been filed about a church they were starting just outside of Grantville's

jurisdiction. Jimmy organized an armed escort to stand guard over the new church when the local Lutherans started getting nasty in spite of the Anabaptists having the local count's permission. They thought well of him for it for it.

The biggest surprise was the number of people who showed up because James Richard Shaver had defended Grantville's honor on the fields of Philosophy in the face of a nasty stuffed-shirt German who still continued to bad mouth up-timers and up-time values. He asked Jimmy if war was mankind's greatest glory or greatest shame. "Neither," Jimmy replied, "our greatest glory is to love our wives and raise our children well, our greatest shame is an un-cherished child." The philosopher from Berlin didn't like the answer.

Bina Rae had a staff member from the home to say a few words and then there was a walk to the cemetery followed by a quiet, catered meal planned for the immediate family at Bina's house.

Jimmy found himself in the middle of the street between Club 250 and the Gardens with half of the people who walked back from the graveyard with him going one way, and half going the other. Both halves were ready to buy him a drink. To everyone's shock, he went home to do his drinking alone.

Bina was dumbfounded at the turn out. Jimmy was a drunk. No one respects a drunk.

A life-sized angel with Merle's face carved in fine white marble stood at the head of the open grave. She had specified a simple grave stone to Alberto Ugolini down at the monument company. Jimmy had changed her order when he paid for it.

"Jimmy, that ain't what Bina ordered."

"I'm payin' for it. It's what I want. If you won't arrange it, I'll find someone who will."

"No, I'll get 'er done," Alberto answered.

* * *

Three days after the funeral, at about two-thirty in the afternoon, the door to Club 250 opened on a nearly empty bar. Bina came through the door, walked to the middle of the bar, hopped up onto a bar stool and said to her ex-husband, "Buy me a beer."

Without a word he waved two fingers at Ken and two bottles and a glass arrived in short order. Bina poured her own when it was apparent Jimmy wouldn't play the gentleman and do it for her. She downed half of it in one

long gulp and let out a sound halfway between a gasp and a sigh. "You loved her."

Jimmy didn't say a word.

"Jimmy, I didn't understand."

He sipped his beer out of the bottle. You can't talk while drinking. He took a breath and then he took another long sip.

"I was hurt, Jimmy."

He looked at the mirror behind the bar.

"I thought it was your fault."

He took another drink.

"I'm sorry, Jimmy."

He waved for two more beers.

"You're not the only one hurting you know?"

Silence still replied.

"Damn it, Jimmy. I'm sorry!"

He said nothing.

"Aren't you going to say anything?"

He gazed into the mirror, not seeing what was there.

Bina slid off the stool and left.

Before the door was closed behind her, Ken plopped a bottle of whiskey and a shot glass on the bar in front of Jimmy without saying a word. To Ken's surprise, Jimmy finished his beer and left without touching the whiskey.

* * *

Old Joe Jenkins sat on the screened-in back porch watching the garden as the sun went down. An ancient single-shot twenty-two leaned against the door jamb in case he saw a rabbit. Good things come to those with. There's no better bait for a rabbit than a vegetable patch. A raccoon or an opossum was almost as good though they took a little more fixin'.

There was movement off to the right where the trace led through the back of the neighbor's place and down to the hard road. "Company comin," Joe said. His old driveway was off to the left of the house and ran straight off the highest cliff left by the ring of fire. "Good thing I get on with the neighbors or I'd have no way into town."

"Hello the house," a familiar voice called out.

"That you, Jimmy Dick?" Joe called back.

"Yeah."

"Well, come on up."

Joe watched the man he knew to be in his fifties—and who looked ten years older than his age—make his way through the twilight. Tonight Jimmy looked even more haggard and worn than usual.

"Hey, Jimmy, come on in and sit a spell. I've got a jug my pa put down." Joe indicated an old brown jug of corn liquor. "Aged to perfection in a charred oak barrel and then put up in jugs. Let me get you a glass."

"Don't bother, I ain't thirsty."

"Thirty-year-old whiskey? Smooth as silk?"

Jimmy shook his head. "I'd take one of those if you got one to spare," Jimmy indicated a cigarette glowing in the ashtray next to Joe's rocking chair.

Joe pointed to a wooden box on the table next to the ash tray. "Help yourself."

Jimmy lit up and took a deep drag. "Damn, Joe have you been sittin' on a stash of up-time cigarettes all this time?"

"Nope. They'd be stale by now, even if you froze 'em. I rolled these. Years ago the wife got tired of me hand rolling the things. Said they looked nasty. So she bought me a roller and a crate of papers for Christmas."

"Yeah, but this is good, mellow up-time tobacco, not like that harsh cow shit stuff they sell in town."



"I got a plant growin' in the greenhouse out behind the barn."

"You're sittin' on a fortune."

"Can't grow it except in the greenhouse. Season's too short. The papers will see me out, but if I took to sellin' the things then when they're gone there

ain't no more and I can't smoke the money."

"You could sell the seed and they could take it down to Spain and ship it back."

"Could. Then more people might take it up. Did you see the little book in German that was goin' 'round? Someone tryin' real hard to stop the trade before it starts." The truth was that lung cancer caused Joe's wife's death and the print run of the up-time study on tobacco and cancer was his doing.

"Joe, I know who paid for that book to be published," Jimmy said.

"Caught me, did ya'?"

Jimmy nodded.

"Well, I'm about done for and I figure a man oughta give somethin' back. Once it's out there then any damn fool who takes up with it deserves what they get.

"What brings you to my mountaintop this late in the day, Jimmy?"

"Needed to talk to you. I was wondering if you would teach me Latin?"

"Why in tarnation would you want to do that?"

"It's what you and Onofrio used with that Kraut. I've got the reputation of being a philosopher. It's embarrassing to have the name and not be able to talk the game. Did you know I'm getting mail from all over Europe? It's mostly all in Latin. If I'm going to be a serious philosopher these days, then I need to know Latin."

"Sorry to hear about Merle," Joe said.

"Thanks," Jimmy replied in what Joe thought of as an empty voice.

"Jimmy if you want to learn Latin, talk to Onofrio. He's better at it than I am."

"I heard you with the Kraut that night in Grantville's Fine Foods. You're better at slingin' that yack than he is."

"He stops and thinks before he talks. No, Jimmy, his Latin is better than mine 'cause his English is. I think in ain'ts and oughtas and 'causes. He learned to think in book English. So he has book Latin. It's pure and mine is tainted. Besides, he's a teacher and I ain't. Then, too, he just retired again. So he has the time. I'm still workin' a farm up here."

"Yeah, I hear about Onofrio. Rev. Wiley's kid got the old man canned after he argued the kid into the ground over religion versus science." William Wiley's aggressive atheism ran up against Emanuel Onofrio who pointed out to Will that ultimately he accepted science on faith. Having his world view challenged did not set well with Will and he raised a stink accusing Onofrio

of teaching religion along with math. "Wiley should have taken a horse whip to that boy of his when it would have done some good."

"I hear tell he did, and I hear tell that's the problem. I also hear Onofrio could have stayed on if he'd wanted but he was ready to give it up anyway.

"Still, he's the one you want to get to teach you Latin. You're welcome to come up any time and give me a hand with the chores and practice your Latin when you've got some, but if you want book learnin', go see Onofrio.

"Shhh. Now sit easy and be quiet. There's a rabbit takin' a nibble of the head of lettuce I was going to make a salad out of tomorrow." Joe quietly stood up and eased the rifle out the screen door. The rifle popped and Joe smiled.

"Well, from the size of it, it's an old one. It looks like we'll be havin' rabbit stew for supper tonight. Why don't you go fetch it in and I'll start supper."

Jimmy left the next afternoon with a dozen 'real' cigarettes having not had a drink of liquor all the while he was there.

* * *

Jimmy pushed up to his usual place at the bar. Club 250 was at its lunch crowd peak. Ken set a cold one in front of Jimmy without a word. Eye contact was made.

"Burger and fries," Jimmy said.

At the sound of Jimmy's voice, Julio looked up from his lunch, a cold beer in a glass with an absolutely fascinating bottom. "You're late."

"Didn't know I was on the clock." For years Jimmy was one of the first of the lunch crowd to show up. He was often still in the same spot at last call.

"Where ya' been?"

"The library."

"The library? What in hell are you doing in a library?"

"Working."

Julio snorted in disbelief. "Now that's funny.

"You never worked in your life until we landed here." This was not completely true, but it was close enough. Jimmy hadn't worked a day up-time since he came home to find his wife and daughter gone. Eventually he got by on a disability check. Now he got by on the rent from inherited real estate. "Then, as soon as we had a rail line from the coal mine to the power plant and we were over the hump, you quit workin' for the railroad. What's up, Jimmy? Where have you really been?"

"Told ya'. I've been down at the library working."

"Nobody works at the library. All you do there is read. What're ya' up to?"

"Julio, you know how the cops saw to it I've got the name for bein' a philosopher. Shit, you and Ken helped make it happen. Well, if I've got the name as a player, I figure I oughta at least be able to talk about the rules of the game. So I've been spending some time down at the library trying to find out just what the rules are."

Julio snorted. "It was a joke! Nobody but the visiting Kraut was serious. You ain't no more of a philosopher than I am."

"Tell me something, Julio. Have you got three letters from Italy and another one from Morocco sittin' at home asking questions or invitin' you to come visit?"

"Of course not," Julio said.

"Well, I do. That Kraut I had dinner with has been bad-mouthin' Grantville, up-timers in general, and me in particular all over the place. As far as the world is concerned, *I* am Grantville's foremost philosopher. Oddly enough, he is reporting what we told him accurately, and in spite of his ridicule it seems it's being well received. Under the circumstances I think I oughta have some idea what I am talkin' about. Don't you?"

An amazed Julio replied, "Three letters from Italy?"

"Yeah, I've got two invitations to visit Rome from two different cardinals. The other invite is from Venice."

Julio was impressed. "You goin' to go?"

"Hell, no. Least wise, not until I know what I am talkin' about. Joe and Emanuel got me through the dinner. If I went off without them, I'd embarrass myself and all of us. So I've been spendin'—spending—time down at the library reading philosophy and learning Latin.

"Emanuel is all over me about dropping letters and using contractions. He says if I'm sloppy with English I'll be sloppy with Latin, so he is after me to clean up my language. I tell you, Julio, being a philosopher is turnin'—turning—into a lot of work. But one of these days I am going to get cornered and Grantville's reputation will be at stake, so I need to know what I am talking about."

"Wow, Jimmy, I'm sorry. I didn't mean to land you in a situation like that. I mean, Ken and I just saw that Grantville was goin' ta be laughin' about the Kraut and we just figured we should help you laugh with 'em instead of bein' laughed at. I figured it would just blow over."

"I figured the same thing. It worked too, at least for a while. But I don't want to get caught short again. If you know what I mean."

Jimmy ate lunch, and left. He stopped in for a burger and fries for dinner and went home early. For the second, or at most the third, time in his adult life he had found something worth doing.

* * *

A bit over a month after Jimmy had spent the night, Joe opened the back door to his house shortly before sundown and was hit with the unexpected aroma of dinner on the stove.



Jimmy knew Joe's habit of eating a big breakfast, a solid lunch and a light dinner after the sun went down. When he stopped in town to pick up a bucket of Hungarian dumplings, he couldn't resist a pan of ready-to-bake biscuits. He also toted a six pack of a new root beer which had the teetotalers

in town standing in line. At the sound of the door opening, without looking up from the book he was pouring over, Jimmy said, "Dinner in about half an hour. I figured it was my turn to cook."

"Thanks. A fella' can get tired of eatin' his own cookin'." It was a polite lie. Joe was a good cook and enjoyed cooking the dishes of his childhood. He glanced over at the book Jimmy was reading. Joe had left his German bible on the table. When he'd read through it, he'd put it away and read the French. Now that he spoke Latin, he read it in turn, also. He was thinking of taking another stab at Greek and maybe Hebrew, just because he had the time to do it. "Your German is good enough to read it?" he asked Jimmy.

"I've been over John, Chapter Six in Latin so many times I've got it memorized. So if I don't know the words I still know the meaning."

"Emanuel is teaching you Latin out of the bible then?"

"Yeah. He says philosophy is just secular theology and most philosophers are either arguing for or against scripture, so I need to know scripture to know what they're talking about. I think its all bull. I think the Latin in the Bible is what he is most at ease with so it's what he wants to teach."

Joe had a different opinion. He figured it was just a way for Emanuel to slip bible study into a language-tutoring program. He also figured he might as well help it along. "Mathew Chapter Six? What do you think of what you're reading?"



"The Lord's Prayer is nothing new. But I think Judaism makes a whole lot more sense. You've got, what, six hundred and thirteen laws. Three hundred and sixty-five of them are things you can't do and the others are things you must do. So, you got a list. Do it and you're all right. Don't do it and God will get you. That I understand.

"But take the verse right after the Lord's Prayer. If you don't forgive others then God won't forgive you. Joe it ain't—it isn't—right. People do bad things in this world. I'm just supposed to forgive them and forget about it? I should just let them get off scot-free?"

"Who says they do? 'Vengeance is mine,' sayeth the Lord, 'I will repay. Be sure your sins will find you out. It is appointed unto man once to die and

after this the judgment. Let no man deceive you with vain words: for because of these things cometh the wrath of God upon the children of disobedience.'

"The point of forgiveness is not for the benefit of the forgiven. It's for the benefit of the forgiver."

"What do you mean by that?" Jimmy asked.

"Someone does somethin' to you. So you get even. How? By doing something bad back. You've just hurt yourself by taking on an evil deed. Then of course they're gonna get even and then you need to do something else. Vengeance does not go long un-revenged.

"Now let's say someone does somethin' and you don't get even. You just stay mad about it. So you carry the anger and bitterness around with you and it contaminates your whole life. You not only let them hurt you, you helped them to go on hurting you.

"If you've got a pack full of old hurts and grievance you're carrying around, then at the end of the day you're tired and worn out. If you dump 'em and let 'em go, your life goes easier. Chances are it doesn't make any difference to the other party if you forgave them or not. In most cases they don't even know it, unless you are actively tryin' to hurt 'em. Then instead of you havin' fun and enjoyin' life you're lettin' them dominate your life 'cause they're in your thoughts and you are just letting them drag you down. In most cases even if they do know they don't care.

"Jimmy, the point of forgiveness is not for the benefit of the forgiven. It's to make life easier and more pleasant for the forgiver." Joe could tell from the look on Jimmy's face the idea was new to him. He figured he should let Jimmy think on it. "I've got a critter that's been eatin' up my garden. I'm gonna sit out on the porch and watch for him. You give me a holler when the vittles are ready."

Jimmy sat there staring at the text but not seeing it for the longest time. What the old man said made sense. For all these years what Bina did had dominated his life. She moved out and took his baby girl with her. Then she made life miserable and wouldn't let him have his visitation rights. What she took from him—his reason for living, his baby daughter and his loving wife, crushed him. It not only ended his life at the time, it rode him like an old hag, like a burden that was almost . . . no . . . *was* too much to bear. For all the years of Merle's life, his life was pain and emptiness filled with hate for Bina and pity for himself.

It was time to just let it go. He wasn't a young man but he still had a life to live. Why in the world should what Bina did all those years ago ruin what

life he had left?

"God, I don't know if I believe in you or not. But if you do exist, help me to forgive Bina and let go. And God . . . if you don't exist, I guess I'll just have to let go of it on my own."

Jimmy sniffed the air. Something was burning. "The biscuits!" he yelped. He stood up to get to the oven. What should have been just enough energy to lift his tired bones sent the chair flying and caused the table to move, he felt physically lighter, almost like he was floating.

"Everything alright in there?" Joe called.

"Yeah, Joe, I'm fine."

The biscuits weren't burned too badly. They could still be eaten. Jimmy smiled. Life was good.

* * *

Wedding Daze

Written by Virginia DeMarce

Grantville, August 1634

Velma Hardesty took a good look at herself in the mirror.

Jacques-Pierre Dumais came to the trailer and talked to her for an hour or two at least three or four times a week and gave her ideas on which she was to Meditate. She smiled at her reflection, a little sourly. She bet there wasn't a single soul in Grantville who would believe that he only offered her Spiritual Comfort. She scarcely believed it herself.

She used to read a lot about Spiritual Enlightenment. After all, the astrology magazines at the grocery stores, up-time, before the Ring of Fire, were really into it. She hadn't really believed that it worked, though. But three months of receiving regular Spiritual Comfort from Jacques-Pierre had done wonders. She had to admit it. Having someone who listened to her—really listened—had made so much difference.

Although she didn't like to admit it, even to herself, his stern admonitions that slurping down your wine like it was water did not give you an opportunity to appreciate the bouquet properly had done wonders, too. Jacques-Pierre's father owned a vineyard in Languedoc. He absolutely forbade her to drink anything stronger than wine. It interfered with Spiritual Enlightenment, he said, not to mention having a destructive impact on the palate. So she sipped rather than slurped (well, most of the time).

And tried to Meditate, just as he said. For each of the Themes he gave her, she was to walk around town every day until she had spoken to at least four people with whom she could share Words of Enlightened Wisdom. She was supposed to share each Theme with four different people. She didn't bother with that, though. Whenever she had a new one, she shared it with the receptionist at the Probate Court and the receptionist in Judge Maurice Tito's office, since she would be talking to them about money and custody of Susan anyway, dropping off papers and things like that.

She sort of wished that Jacques-Pierre would get on the stick about helping her with Susan and the money. She'd have to remind him. Though, to be honest, now that she wasn't thinking as woozily as she had been last month, there might not be much that he could do. Garbage collector just

wasn't the most influential job in town. It was nice of him to have offered, though.

But she had to do extra walking to find enough people to share the rest of the Themes. By now, she knew almost every place in town where she could be sure of finding a captive audience. Checkout line at the grocery store. Circulation desk at the public library. She figured that even if she just *said* it to the person behind the counter, she had *shared* it with everyone in line. That saved a lot of walking, but even so, she'd lost eight pounds.

She looked back at the mirror. None of it from the boobs, she noted with satisfaction. Those had been a worthwhile investment.

* * *



A couple of weeks later, their Spiritual Comfort session was accompanied by a good-sized glass of the best French wine, newly delivered from a friend of Jacques-Pierre's, a guy named Laurent Mauger. Jacques-Pierre told her that the man went as a Dutch merchant from Haarlem, which he was. But his grandparents had been Huguenots from Dieppe.

Jacques-Pierre told her that Mauger's wife had died three years before, and that his family—the sons, the unmarried older sisters and half-sisters,

the widowed sister and half-sister, the nephews and half-nephews—had taken advantage of his grief to get him to sign a pledge that he would not remarry and beget another family. The marriage had not been a great romance, no. But it had endured for two decades and they had reared children together. Mauger had mourned his wife when she died. Such a thing was a quite legally binding document in private law—signed, notarized, and duly filed with the family's attorney, beyond a doubt. Mauger was too strict a Calvinist to go whoring. And, though fat, he was quite healthy, as evidenced by the energy with which he pursued the business affairs that took him around Europe on these frequent trips.

The guy had to be lonely, Velma thought.

The next evening, Mauger joined them for their glasses of wine. He sat there, fat and fiftyish, saying little, toying with his goblet and contemplating Velma's cleavage. But that was all. A couple of days later, he left again. Jacques-Pierre promised to let her know just as soon as he got back in town.

October 1634

Velma started looking through her closet. Jacques-Pierre never would be interested her, personally speaking, except for providing Spiritual Comfort. Mauger was fat, but . . . she'd been really short on other forms of comfort lately. He wasn't *that* fat. Jacques-Pierre said that sleeping around interfered with her Spiritual Enlightenment. Mauger was one of Jacques-Pierre's friends. Maybe he'd make an exception for a friend.

Or maybe she'd just interfere with her Spiritual Enlightenment and get back on track after Mauger left on his next business trip.

She pulled out a lovely dress of mauve faux leather with slits in interesting spots. It had matching boots. Sighed. Not yet. Five more pounds, at least, if she didn't want to strip the teeth out of the zipper. Closer to ten. Back to the closet. She didn't think that Mauger was the type to go for a fire-engine red jumpsuit. Anyway, not with the henna on her hair. That suit had been for a blond. She dug deeper. Ah.

* * *

She'd been right. There was nothing quite like a halter top with sequins to focus a man's attention where she wanted it. Laurent Mauger had returned precisely when he had promised. He focused. He practically panted. But he rose courteously when she announced that it was time for her to go home. He didn't offer to accompany her. Damn.

She would have found it less damnable if she could have heard his subsequent conversation with Jacques-Pierre, who was putting the most favorable spin on things. Truth, if Jacques-Pierre didn't manage to get this woman out of his way, he thought that he would go quite insane. Madame Haggerty was one thing. A useful source of data. Not especially time consuming. Madame Hardesty, on the other hand . . . if only her son was not Frank Jackson's liaison to Don Francisco Nasi. The things that a man had to endure for the sake of his country.

"Ah, Laurent. Yes, twice widowed. Most unfortunate." He saw no need to bring up that until the Ring of Fire, both of her former husbands had been quite alive. They were now legally dead. The courts had ruled on that. "A first cousin of Prime Minister Stearns, I understand." There was the tragic recent death of one of her daughters. Jacques-Pierre racked his brain. There

was the fact that the youngest girl did not live with Velma—he could say that it was for the purposes of attending school—and thus would not have to be taken into Laurent's household. And there was, of course, the lovely, casuistic, thought that Laurent had only pledged not to take a second wife who would complicate the inheritance by bearing him more children.



Another idea came to Jacques-Pierre. And, of course, she understood the importance of clothing. Laurent's sisters, fine women, all of them, had not adapted to the new villa and the country estate. They still dressed as if they were of the bourgeoisie, with their respectable black dresses, white

collars, and caps. But that was no requirement of the Calvinist faith. *Certainement*, the Huguenot nobles of France, such as the wife of Duke Henri de Rohan, did not dress so. Nor did the court of Frederik Hendrick of Orange. Such a wife as Madame Hardesty would display to the full the dimensions of Laurent's wealth. And it was that wealth which would enable him to obtain daughters of the lesser nobility as brides for his sons and nephews.

It was a long conversation, but a little jerky on Mauger's part. Jacques-Pierre suspected that his mind kept drifting back to the sequins, which was a good thing.

* * *

"My religion?" Velma asked. Why did Laurent Mauger want to know her religion, of all things? "I'm, uh, Presbyterian." Well, she was. Or had been, once upon a time. When she was baptized. Her mother was definitely Presbyterian. Tina's disastrous funeral had been held in the Presbyterian church. Not that the Reverend Enoch Wiley thought very highly of her, but "Presbyterian" would do.

She was wearing a lemon yellow eyelet blouse with ruffles that nicely accented the deep V-neck. It was a tie style, with no buttons, so the ruffles moved nicely when she breathed. She leaned toward him, breathing. It should be apparent, she thought, that no artificial means of support were present. And she didn't think that the seventeenth century knew about boob jobs.

"Presbyterian." Laurent Mauger sighed with satisfaction.

"Don't you believe, Monsieur Mauger," Velma asked, "that some things are just Meant?"

Mentally, Mauger briefly compared the stiff corsets in which his late wife had encased herself throughout most of their marriage to the delightful flexibility of Velma's upper torso. He reached a decision; some things were indeed Meant. Presuming, of course, that Meant signified predestined. Given the religious whirlwind of this town, that this elegant cousin of Prime Minister Stearns was Calvinist had almost been too much to hope for. It must be Meant, indeed. "Madame, would you do me the honor of accepting my hand in marriage?"

Velma blinked. She had not expected that. The most she had really been hoping for was a bit of non-Spiritual comfort and a few nice gifts. But Jacques-Pierre had dropped the information that Mauger had money. Pots

and pots of money, apparently. Pots and pots of money were not to be sneezed at. But if she ever let this old goat anywhere near Enoch Wiley before the knot was tied, the reverend would give him a version of her life story that would scare him off for good.

"Only if you're willing to marry at City Hall," she said. "I don't really hold with church weddings."

Mauger's Counter-Remonstrant heart warmed. A true Calvinist, then. None of this creeping, compromising, semi-Papism. As Calvin himself had written, "Of course marriage is a gift of God. That does not mean that it is within the proper province of the church, any more than are agriculture or shoemaking, which are also gifts of God to humankind." He beamed.

He had taken a comfortable room at the new Higgins hotel. He requested that for the remainder of his stay, it should be expanded to a suite.



Velma sold the trailer. With the way that real estate prices in Grantville had skyrocketed, it brought in quite a bit. She packed a lot of the contents to take with them. It came to several wagonloads of freight, but Laurent didn't mind. He had been fascinated by the lava lamps. Luckily, they were the kind that worked with candles in the base and didn't need to be plugged in, so in their new home in Haarlem, they could sit and watch the lava lamps together when they were not doing other things.

Mauger received the news that his wife would be bringing him a dowry with delight. Jacques-Pierre had not advised him of this bonus in advance. He did not discover it until Velma requested, very properly for a wife, that he take care of the business of switching the bank draft to Haarlem. It was not a large dowry by the standards of the merchant families of the Netherlands, but every source of investment funds helped and it would make it a lot easier to explain his decision to his family.

Last of all, Velma packed her clothes and sent nasty-nice notes to all her relatives. She thought a lot about her wedding dress. Penny Reading managed to open the seams on the mauve faux leather just enough that she could get into it. Old Mittie Barger disguised the little needle holes that ran down under her arms with embroidery and sewed bias tape on the inside of the seams to make them stronger. She had found the matching boots. When she showed up for the wedding, she could tell from Laurent's expression that her choice was a smashing success.

Even Jacques-Pierre had a funny look on his face.

* * *

Two weeks after the wedding, Laurent asked rather doubtfully, "Uh, what?"

"I'm having my period." Velma frowned. "You should know about that. I thought you'd been married before. I'm only a little past forty, after all." Well, forty-six last July, if you wanted to be picky about it. Minor details.

Laurent swallowed. He had been married before. He did know about it. He had a feeling that Jacques-Pierre had misled him about Madame Hardesty's age. Which did not mean that he intended to forego the joys and blessings of matrimony. He wouldn't even suggest such a thing to a fine woman who had married him in good faith.

Which was just as well. Velma was deriving a great deal of non-Spiritual comfort from her marriage. Laurent was still pretty lively about it all, fat or not. At the end of the week, they resumed matrimonial relations.

They left for Haarlem shortly thereafter. Velma didn't have her period on the trip. She put it down to all the jostling in the carriage and the disruption of her schedule that travel brought.

* * *

Doc

Written by Gorg Huff and Paula Goodlett



"Get out of the goddamned way, Little Ferdie!"

Ferdinand Bader got out of Sergeant Sandler's way as quickly as he could. Not that he was really in the way, but it was typical of Sandler to shout, just as it was typical of Captain Lehrer to look down his rather pointed nose at "Little Ferdie."

"Look at the mouse jump!"

Ferdinand carefully didn't look in Corporal Melman's direction. Melman was just plain mean and looked for excuses to make Ferdinand miserable. The mouse comment was, again, typical. Ferdinand had been hearing comments much like it for most of his life. His voice was high and squeaky, commanding neither obedience nor respect. It never had. Further, by inclination, Ferdinand avoided conflict.

He wouldn't even have been in the Army, if it hadn't been for getting drunk that night in Jena, after Papa cut off his funds for the university. The life of a student had suited him just fine. Thankfully, for once the Army had gotten it right and sent Ferdinand to medic school, where he'd finally found his calling.

Not that the calling was easy work. Especially with a pissed off captain, sergeant and corporal. Which wasn't at all fair. Ferdinand hadn't known that medics were a separate corps, not part of the Army, Navy, Air Force or Marines.

* * *

"No!" Ferdinand shouted. For the first time in his life, he was obeyed. "Don't try to move him. He may have internal injuries!" The shocking bit was

that his voice, as squeaky as ever, had suddenly been obeyed. Or maybe it was that he had given the command in the first place, or that he was running into the middle of a battle. Ferdinand was dealing with a number of shocking occurrences at the moment. Mostly by ignoring them. He had a patient and that was all that he could allow to matter.

He knelt in the mud outside of Luebeck in the spring of 1634, after a sortie against the disintegrating Danish and French armies. With a pair of medical scissors, he cut away the heavy woolen cloth that was worn as much for its ability to slow a musket ball or pike thrust as for its warmth. That it didn't stop musket balls, he had clear evidence. In the form of what was almost a sucking chest wound.

"You!" Ferdinand pointed at one of the men standing around. "Hold him!" He didn't realize until later that the person he was ordering about was his sergeant. "Unless you want him to bleed out into his lung. Keep him still!"



Not exactly his sergeant. In theory, at least, the Medical Corps had a different chain of command. Sergeant Sandler had apparently not studied the theory. "Little Ferdie," since arriving at Luebeck, had been assigned every midnight guard duty and shit detail the sergeant could come up with. And "Little Ferdie" had had the good sense—or lack of guts—to put up with it. He was fully aware that the captain had a similar opinion of the medic's separate chain of command.

Not that that was the primary reason Ferdinand had failed to complain. It was more in the way of an excuse he gave himself, but even he didn't really believe it. Ferdinand simply wasn't a very forceful person. Never had been. He pulled a biter out of his bag and shoved it into the patient's mouth. "Karl, bite down on this and try to hold still. What I'm about to do is probably going

to hurt worse than getting shot did, but we can't move you till I stabilize that rib. The musket ball broke your number four left rib in two places. It's a miracle it didn't rip your left lung apart. But if you move too much, the busted pieces of your rib are going to do the job the ball didn't."

As he was talking, Ferdinand was pulling stuff from the medic bag. Including the alcohol. That was where he had drawn the line with Sergeant Sandler, and with Karl and the other troops in the company. They had wanted to drink the stuff. But he had had it drilled into him in medic class that it was a bad idea. Not just because it would be needed for sterilizing wounds like this one. Pure alcohol was bloody dangerous to drink.

The ball had cut a crease in Karl's chest. But to do what he was going to have to do, Ferdinand was going to have to cut some more. First the alcohol, then the scalpel, then the tweezers to grab bone fragments.

Ferdinand didn't hear the shot, but he felt the flinch as one of the men holding Karl in place instinctively tried to duck. "Hold steady, damn it!" Alcohol on his hands again, then reaching into Karl's chest to carefully pull a large chunk of bone away from his lung.

Someone made a retching sound. Ferdinand didn't even look up. "Johan, if you're going to throw up, let somebody else hold his arm and get away from here!" A suture used to tie the fragment of rib in place, then another to repair a nick in the lung that Ferdinand had caused while he was pulling the large fragment of rib, away from the lung. All the time, praying that Karl hadn't lost too much blood. That he wouldn't die of an infection caused by the muddy ground on which he was lying. That Ferdinand had guessed right about what to do. That the pieces of gut he'd used to get Karl's ribs together wouldn't break. Ferdinand applied the sterile bandage and called for a stretcher. Karl had lost consciousness about half way through the procedure. Which went to prove what Ferdinand had already known; that Karl was one tough son of a . . .

"Gently now! Gently! We can't afford to put stress on the body." As the stretcher bearers were carrying Karl away, Ferdinand looked around for another patient, only to see that the battle was over. He guessed that it hadn't been that much of a battle in the great scheme of things. The Danish forces were back where they belonged. And apparently casualties had been fairly light. There hadn't been any other calls for medics in his area anyway.

Which is what he should have been praying about, he realized. It had taken him. . . Ferdinand didn't know how long it had taken him. But it was more time than a field medic was supposed to spend on a patient. His job was

supposed to be simply to get them stable and transport them back to a real doctor. But Ferdinand knew that if he tried to do it that way, Karl would've been dead before he got back to Luebeck.

* * *



The doctor was Jena trained, with six months in the Grantville teaching hospital. He was surprisingly good for a military unit. And he questioned Ferdinand about every step he had taken. The issue was how much damage would have actually been done transferring Karl back to the aid station that had been set up in a converted beer hall in the town. Then, once he was clear on what had happened, the doctor had dumped all over Ferdinand. Not because he disagreed about the effect on Karl, but because performing that kind of treatment in the field meant that Ferdinand wasn't available in case someone else needed him.

They found someone with Karl's blood type to give him a couple of pints. And the doctor went back in and cleaned things up; made sure the rib fragments were in the right place. And that the lung wasn't leaking.

Karl would be returning to light duty in about three weeks. He should be back to full duty, if there were no complications, about nine weeks after that.

Ferdinand drew a deep breath. "Now, back to the company."

* * *

Ferdinand was nervous about returning to his company. He was remembering ordering the sergeant and the men of his company about as though he was the captain or something. Especially he remembered telling Johan to get away. Johan wasn't a bad guy, but he was very proud of his courage and didn't take kindly to anyone disparaging it. For the life of him, Ferdinand couldn't remember who he had cussed out for flinching or why they had flinched. But he figured he was in trouble for it, whoever it was.

"How's Karl?" Sergeant Sandler asked.

"Doctor Jensen says that he will be in bed for the next three weeks or so, then light duty. That's assuming no complications, Sergeant."

Sandler nodded and said, "Get cleaned up and get some rest."

Ferdinand looked down at his uniform. It was covered in blood and mud with horse shit on the knees. He wondered, sort of vaguely, why the sergeant wasn't screaming at him about the uniform. Sandler was a stickler for proper military appearance. But, mostly, Ferdinand was too tired to care. He managed to get his uniform off and get some of the blood that had splashed on his face and hands up to his elbows off, then fell into bed.

* * *

Sergeant Sandler looked at the little man as he walked away. Covered in blood. Granted, it wasn't his blood, but Sandler realized that if Little Ferdie hadn't been there, the man whose blood it was would be dead. And that man was a friend of his. Sandler was a tough man, a veteran of many battles. He had seen a lot of wounds. Karl's wound was the sort that killed people, killed them in a matter of hours and often in minutes. He, unlike Ferdinand, had not been busy with the battle. He'd been holding Karl's shoulders. He hadn't flinched from the musket ball that had come near, as that was a matter of years of experience. He didn't think Ferdinand had even heard the shot. He was too busy saving the life of a man who had been less than kind to him.

Sometime during the battle, the notion of having a member of the medical corps assigned to his company had gone from being an irritation to a blessing. Hell, Sandler thought, half the doctors he had met couldn't have done what Little Ferdie had done. He didn't know any who could—or would—have done it with musket balls flying.

* * *



"Hey, Doc. How's Karl?" Corporal Melman called as Ferdinand entered the mess the next morning. Ferdinand looked around for the doctor, but didn't see him. He hesitated but it was clear that Melman was talking to him.

"He should be fine in about three months," Ferdinand answered. Melman just nodded. He made no threats and didn't do any blustering about how tough he was.

From then on the men of Ferdinand's company called him "Doc." Ferdinand was never sure why. For that matter, neither were the men who had once teased him so unmercifully. They just knew that they needed a name for the man who would hold their lives in his hands should they be wounded in battle. "Medic" wouldn't do. They knew he wasn't a real doctor with a diploma from a university, but he was what they had. What they *would* have, if they were hit by a musket ball or trampled by a horse.

Ferdinand might not be a real doctor, but he was without a doubt *their* doctor. So they called him Doc.

* * *

One of the reasons Captain Lehrer was less than pleased to have a Medical Corps contingent assigned to his company was that Captain Herr Doctor Jensen was a total stuffed shirt. Who insisted that he was of equal rank and superior status to a mere military captain. Jensen was collage educated and Lehrer, though he could read and do figures, was not an especially literate man.

When Jensen came to complain about the troops calling a mere medic "Doc" Captain Lehrer tried not to laugh for about three seconds, then he started to howl.

Captain Herr Doctor Jensen was not amused. Oddly enough, he wasn't the least bit upset with Medical Corpsman First Class Ferdinand Bader . . . well, maybe the least bit. But he knew Ferdinand, even knew his family to say hello to. He knew darn well that Ferdinand had not insisted on or even encouraged the new nickname. Ferdinand Bader didn't have it in him to demand even the status he was due, much less more than he was due. For instance, Ferdinand had not once mentioned that his father was among the minor nobility. Nor that he had two years of college, one in Leipzig and the second in Jena, before his father had cut him off over political differences and the fact that Ferdinand didn't act like a proper noble.

The issue wasn't about Ferdinand Bader. It was about an important principle. There were too many quacks out there pretending to be medical doctors and killing people through ignorance and superstition. Which was also the reason Jensen was so insistent on his title. At least, that was the reason that he admitted to himself.

"You want me to tell the men to change a nickname?" Captain Lehrer asked, still laughing. "Do you think I am a fool?" *Apparently you do, or you're a fool yourself . . . or both.* "My men are killers, Captain Herr Doctor Jensen, Giving stupid orders that I know they won't obey anyway would decrease my ability to direct who they kill. And who they don't kill.

"The men will continue to call Medic Bader 'Doc' for the same reason they call Melman 'Ogre.' Because they choose to."



After Jensen tried to explain his reasoning, Captain Lehrer nodded "I see your point. But you're applying it to the wrong people in the wrong way. The troops calling Ferdinand 'Doc' isn't going to cause them to run off and get treated by a barber. If anything, it will do the opposite. They will go to Doc and if it's something he can't handle, he'll send them to you. Doc isn't some quack; he is a trained medic—trained enough to put Karl back together in the field and to know when he needs to send the patients to someone with even more training. I don't insist that you call him Doc, but don't expect me to give any orders on the subject and don't you try to give any either. That would make the men less likely to trust you when they need to."

Captain Herr Doctor Jensen wasn't happy about it and he wasn't convinced but there really wasn't anything he could do about it.

* * *

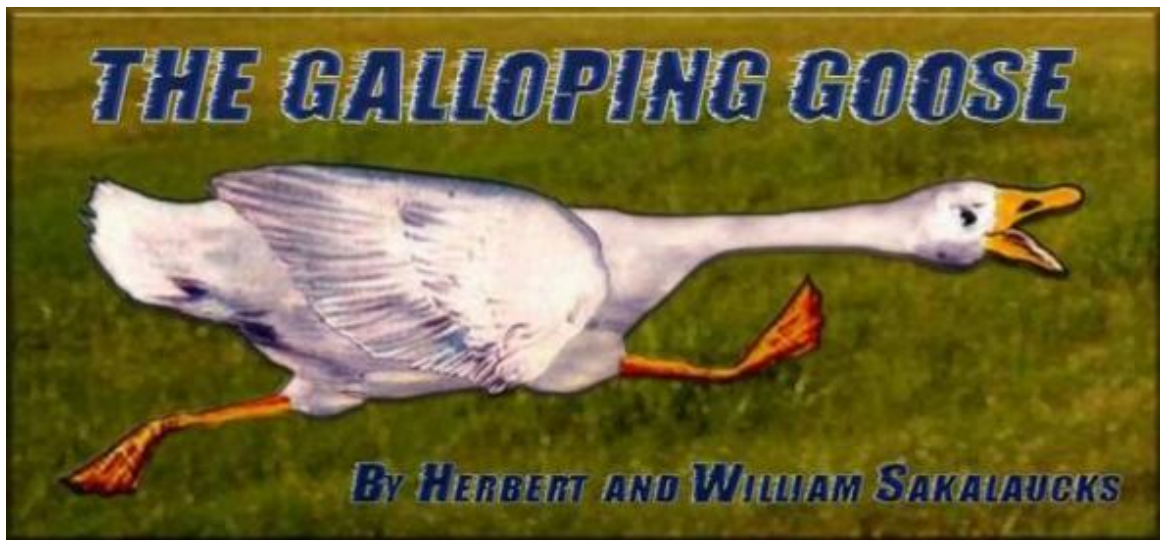
The same custom started up in other units of the USE Army, for the same reason. And where it didn't appear spontaneously, it spread as troopers transferred between units.

And pretty soon, in spite of the stuffed shirts in both the Medical Corps and the regular military wishing it otherwise, a lot of field medics were happier to receive the accolade of "Doc" than they were to get a promotion.

It meant a lot more to them.

The Galloping Goose

Written by Herbert and William Sakalaucks



"Okay, guys, very carefully, peel the logo stencils and coverings off the doors and I'll get the big one on the back end," Arlen instructed. The sharp smell of drying paint hung in the air, a fine mist shrouding the gathered crowd, as Mike and Martin peeled off the new door logos for the Grantville, Rudolstadt, and Saalfeld Railway and Tram Line; the rays of light glistening off the black logo. A capital G above the R and S looked like they were ready to fly with their speed lettering extensions.

"You know, Arlen, this new logo really makes it look like it *is* ready for speed," Martin commented. "How's the rear logo look? You've kept it a real tight secret, I'm not even sure Francisco's spies could have gotten any hint about its design."

"Come on back and see," Arlen said, with a smirk on his face. Everybody crowded around in the tight space behind the engine. There on the back door was a picture of a goose running flat out, neck parallel to the ground, feet in mid-stride. "I'm calling this new engine the 'Galloping Goose' class railbus after its Colorado narrow gauge ancestors up-time."

Resplendent in its silver and black paint scheme, was an old Ford truck cab and frame with a hand-crafted wooden passenger compartment that Martin had built. Martin's prior experience as a boatwright showed in the smooth sweeping lines of the body. It could seat twenty-four passengers and could carry luggage and freight in the back. Arlen had scrounged the glass and seats from an old Blue Bird bus that was being scrapped. The interior

looked like a Black Forest cuckoo clock-makers dream. Every possible inch was carved black walnut and polished to a high sheen. A small propane stove for heat was also in the rear of the car. Underneath the Goose, Arlen had installed a small set of lead wheels with a large drive wheel set in back, powered by a chain drive. The Ford's frame still had a hydraulic lift in front for machinery.

"How fast do you think it can go?" asked one of the workers in the crowd.

"On a good, flat track and no load, probably forty miles per hour. Around here in the hills, and with the rail we've got, maybe twenty to twenty-five with a good tail wind." Most of the GRS's current freight trains averaged around ten miles per hour. "That's still twice as fast as our freight trains can do." Arlen was grinning from ear to ear.

"So, has the railroad bought it already?" Mike tried to prick Arlen's ego a little. They'd been friends since grade school and were always trying to upstage each other. "Last I heard, they wanted to run trials with it to make sure it really worked, and see if passenger demand would support its cost."

"They're still looking at a trial. I've painted this one as a demonstrator. I had to scrounge up just about all the silver auto paint that was left in town. Hopefully, seeing it in railroad colors will help seal the deal." Arlen had put a lot of his own time in on designing and building the Goose, but his enthusiasm still had a bit of doubt clouding it. Mike sensed the hesitation and waited for Arlen to continue. Arlen sighed and went on, "It's probably got the same problem the original Geese had. They tended to gallop from side to side at higher speeds. We've got an upgrade planned for the production model to improve the springs and weight distribution that should solve that problem if it crops up. We just need to get the first one sold. We even have a larger steam-powered version with a wooden body on the drawing board, but first, we have to sell the railroad investors on the idea that passenger business can be a paying proposition."

Passenger service in November 1634 was very austere, expensive, and slow. The Goose showed potential to provide a quick way to overcome many of the objections that had been raised about improving passenger service. Arlen knew that the best engineered equipment still had to be sold to be successful.

The whole crew proceeded to board the Goose while Arlen started the engine. "Mike, since you're a trainee engineer, I thought I'd let you be the one to back her out of the shop and show her to the world."

Mike slipped into the seat that Arlen vacated for him. He turned on the music system and inserted a CD. "I thought this might be appropriate for the occasion." Strains of John Denver singing "Jenny Dreamed of Trains" filled the Goose. Slowly, Mike backed the Goose out into the rail yard and then parked it on the service track. Everybody piled out, many commenting on how beautiful the interior was and how comfortable the seats were. Mike muttered under his breath, "Not if you ever had to ride two hours on a field trip on them."

After a while, the excitement died down and Mike nudged Arlen in the ribs to gently remind him of the passing time. "Don't forget our evening plans. You know that Dee and Mimi are waiting for us to take them to Tyler's Restaurant tonight and we both need to clean up before we meet them. What time are the reservations for?"

The deer in the headlights look that Arlen got told him everything he ever needed to know. "Move! I'll help Martin check that everything's cleaned up with the paint sprayer. He can lock up and I'll meet you at your house."

The shop crew hurried to clear the shop before the boys' girlfriends ended their short, yet exciting lives. Tonight was the informal rehearsal dinner for Arlen and Mimi, who were getting married on Sunday. Mike had gotten leave to be there as the best man and Deidre Hardy was going to be Mimi's maid of honor. All the workers razzed Arlen for his forgetfulness as he hurried off, but they were also proud of what they and Arlen had built. Martin was the proudest of all.

* * *

When Arlen arrived at his parent's home, out of breath, his mother greeted him at the door. "You make sure you don't get any of that grease and paint on the bed. Last time you were late, you just tossed everything and you almost ruined the comforter!"

"I'll be careful, Mom." Arlen responded light-headedly. "Can you call Tyler's and make sure everything is set for the dinner, please?"

"I already did. I also called Mimi and Dee at the new apartment and told them that you and Mike were working at finishing the Goose. I called her back when you came in and they'll meet you at Tyler's in forty five minutes."

Arlen called out, "Thanks, Mom! I've got the coveralls in the basket. I'll start the laundry before I go."

Just as Arlen finished dressing after his shower, Mike arrived and the whole process was repeated. He and Mike checked each other's appearance,

flattened Arlen's cowlick for about the fifth time, put on their best winter coats, and walked to Tyler's.

On the way, Mike went over the plans for Sunday's upcoming nuptials. "Just remember, Arlen," Mike started his lecture, "You've got the easiest part in the whole thing. Make sure you're there by noon. Then, you stand at the front of the church, smile from ear to ear as Mimi walks down the aisle, turn around, say 'I do,' put the ring on her hand, kiss her, turn around and walk down the aisle without tripping. Got that?"

Arlen chuckled, "I think so. Just don't forget the ring, okay?"

"Right."

The friendly banter on wedding plans continued. As they approached Tyler's Mike asked apprehensively, "Are we on time? Dee said she'd skin me if I got you here late."

"Funny, Mimi told me the same thing about you! We've still got five minutes. Wouldn't it be funny if they were late this time?"

"Not a snowballs chance. Speaking of snowballs, I think we're in for some snow. You can almost taste it in the air." Mike loved snow. He'd spent quite a bit of his winter breaks skiing at Snowshoe Mountain before the Ring of Fire and had a knack for sensing when snow conditions would be good.

"I just hope if it does, that it doesn't spoil the service on Sunday. Mimi and I don't have a lot of family that can be here." The thoughts of just what the Ring of Fire had cost them carried Arlen and Mike into Tyler's. Once across the threshold, the aromas from the kitchen woke them from their reverie. They looked anxiously for their dates.

Herman Bartig, the doorman, greeted them as they walked in. "Mimi and Dee are waiting in the bar area for you. They just got here five minutes ago. Don't let them tease you that they've been waiting. They sounded mischievous as they came in!"

When they entered the bar, Mimi spotted Arlen and made a bee line for him. The un-ladylike, full-body kiss drew a round of applause from the regulars at the bar. After the wolf whistles died down and Arlen got his breath back, he asked, "Do I know you, ma'am? My fiancée is supposed to be around here somewhere and she's the really jealous type."

"Just wait 'til Sunday night!" she said with a sly grin. "You ain't seen nothing yet!"

"I hope I'll see nothing on Sunday night. The wait since our betrothal in June has been killing me. Cold showers only work so long!"

Dee came up and greeted Mike with only a slightly more demure kiss. "Maybe next year, Mike?" she asked with a wiggle of her eyebrows. Dee and Mike had been going together since their junior year in high school and were starting to get serious. All four young people had been friends since they were in grade school and the last three years had brought them even closer together. Mimi and Dee were both starting teaching careers and Mike and Arlen had worked on trains since their volunteer days at the Cass Scenic Railway.

The maitre-de came up at that point and interrupted to tell them that their table was ready. The table they approached was covered with a crisply ironed white tablecloth, elegant porcelain plates, stainless steel flatware, crystal glasses and a silk rose in a vase. As they sat down, a waiter arrived with a tray of appetizers. "Compliments of the management, Thuringerwald Oysters, for the bride and groom."

Mike responded with laughter. "After the earlier demonstration, I don't think Arlen will need them, but please, give the chef our thanks!"

The rest of the evening was a complete success. Arlen and Mimi had a chance to have an evening to relax after all the preparations of the past few weeks. When Arlen started to try to talk shop with Mike, Dee fixed him with a withering glare and the subject quickly changed. Around midnight, the celebration broke up and Mike and Arlen escorted the girls back to the new apartment, each couple pausing frequently to embrace and warm up.



The snow started falling softly in large, fluffy flakes. The world seemed to narrow down to just them as the snow muffled the sounds of the evening and visibility decreased

Arlen sighed. "Looks like I'll have to stop by in the morning and shovel."

"I'll have something to warm you up when you're done."

"You'll probably still be asleep. I've got some paperwork to finish if I'm going to get next week free. We've got one engine in for a major repair and I need to show Joachim and his crew how to braze and refinish the broken part. I should be done by noon. I'll stop by afterward to help get the last of my stuff moved into the new place."

They were covered by a light white blanket by the time they finally said good night. Mike and Arlen hurried back to Arlen's parent's home because the snow was now starting to come down in earnest.

* * *

Saturday morning dawned gray, cold and snowy. Even though it was only late November, it looked like the storm was going to dump a lot of snow. Arlen and Mike shoveled out his parents' house and the new apartment. Mimi and Dee had a big breakfast ready for them and then shoved them off to work.

"We've got a ton of stuff to finish up today and it's looking like we'll have to fight the snow as well as time. You guys go do what you need to at the shop and we'll see you later this afternoon." Dee looked like she would brook no argument, so Arlen and Mike set out for the shops.

After trudging through ankle deep snows for fifteen minutes, they were huffing and puffing, just like the engines they worked with. They weren't the first to arrive that morning. They were greeted by a toasty fire in the office's pot belly stove and the aroma from a large pot of coffee warming on top.

"Everybody in?" called Arlen as he walked out to the repair bay. The steam engine sitting there had its piston rods out. The rod from the engineer's side was on the work bench due to a stress crack that had been found during routine maintenance. An instructor from the tech school was coming by to show Arlen and three of his senior down-time shop machinists how to handle the brazing and heat treating. The informal class was set to start at ten. Over the next hour, Arlen was planning to finish his reports to Hugh Lowe, the GRS president, on the Goose and develop a plan for testing the railbus.

As Arlen was putting the finishing touches on the plan, Martin Erlanger came in the front door of the shop, shook off his coat and stamped his boots clear of snow. "Such a day, not even a wild pig would go out!"

"Any word on how long they think this will last?" Arlen was starting to get worried that the weather could ruin the next day's wedding festivities. He knew everyone coming was already in town, but trudging through snow was not his ideal of how a wedding party should leave the church. He didn't want Mimi to be disappointed.

"I just stopped by the radio station and what reports they could get from the west and north show a wide area of snow. They think it will probably go through tonight or maybe tomorrow morning. They also had just gotten an emergency signal from Saalfeld. There's been another industrial accident, this time at the steel works, with some serious injuries. They had to use the radio

because the telegraph line was out. They think there was a snow slide or a tree down somewhere along the rail line. I hope they are able to handle the injuries at the steel works' clinic. The hospital's full and this storm has all the roads closed between here and Saalfeld."

The phone rang. Martin answered, "Hello."

Everyone could hear his end of the conversation and watch his body language. Immediately, they all could tell it wasn't good news. "No, the engine's not ready. You'll have to talk to Arlen about that." Martin held out the receiver. "Arlen, Mr. Lowe from the railroad. He has some questions I can't answer."

Arlen had a bad feeling about what was coming. "Arlen Goss here. What can I do for you, Mr. Lowe?"

"Arlen." Mr. Lowe sounded rushed. "We've had a serious accident at the Saalfeld steelworks. We need to transport two serious burn cases. I've talked to Dr. Adams at the hospital, and he has some real concerns about where best to treat these cases. They've still got a number of people they're treating for that chemical spill and they've got a heavy load of flu cases. Two of their staff members who have some burn experience are at Jena right now working with the university to set up a new trauma unit. Jena hasn't been hit with the flu yet, and this snow should slow down travel enough that it shouldn't spread there too soon. The big question is, can we get them there? Is Number Four done with its rebuild? It's the only engine with a plow that's big enough. We don't have anything else that could get through heavy snow."

"Number Four has a cracked rod. We won't be able to get it rebuilt before Monday."

All Arlen heard was a deep sigh on the other end as Hugh thought back to his conversation with Dr. Adams. The doctor had gotten on his soapbox about all the world's medical problems always having to come to Grantville to be cured. The current overload at the hospital made this an ideal opportunity to showcase what other facilities could do. Hugh decided to see if there was any other way to get the patients safely to Jena. "Is there any way to accelerate the work? The men that got injured were doing some experimental test castings for the railroad and I really want to help."

Arlen saw his chance. "We just finished that railbus I was telling you about last week. It's got enough power to buck the snow and we can put a plow on it. Should take us half an hour to hook up and by the time the medics are ready and get here, we should be ready."

"Great! I'll call the hospital and tell them to have their EMT's meet you at the shop. Just be ready to roll as soon as you can. The reports I've gotten indicate at least two serious burn cases and one fatality already. I'll also send a track crew along, in case there's any trouble on the line."

"We'll be ready, Mr. Lowe." Arlen hung up and motioned the staff to gather round. "Martin, call the county road shop and tell them they need to bring over the old wedge plow truck so that we can use the plow. Vandy Rowland, the foreman, will know which one we need. Julius, get the Goose fueled and make sure we've got extra fuel for the motor and the stove. Stefan and Joachim, take off the arm rests on the last four sets of seats. Put boards between them and get some sleeping bags so that we can use them as beds. Mike, give Mimi a call and tell her what's happening. Also, I'll need an engineer, can you handle it?"

"Sure, but don't you want someone with more experience than I've got running the Goose?"

"You *are* the most experienced engineer we've got for it. Nobody outside the shop has even been in it and Martin and I will be along if any problems crop up." Mike's eyes went wide, but his military training kicked in and he just saluted and went to finish his tasks.

Arlen took a deep breath and started going through a mental checklist on what else might be needed. This would be the Goose's shakedown run and there were a lot of things that could go wrong, especially with the amount of snow they had already gotten and what was still coming.

"Spare drive chain, extra sand for traction, rerailer, bars, shovels and jacks in case of derailment, track bars and spike mauls in case of track problems, two chainsaws, extra blankets, food and water in case we're stranded and a rabbit's foot for luck." As he thought of each item, Arlen called out to the shop crew and they located and loaded the item into the freight compartment. Martin got two of the shop crew to help him top off the sandboxes on the Goose and then added four fifty-pound bags of sand in the back. By the time he'd finished his loading, the truck had arrived with the plow. Mason Sizemore came in, shaking off snow like a small bear and sputtering about proper channels for requisitioning government property.

"Mason, please, we've got an emergency. Just help us get the plow switched over to the railbus."

Mason looked like he wanted to say some more but then acquiesced. "The snow is breaking branches and trees that are blocking the roads. Where did you say you want the plow set?"

Arlen pointed out towards the yard. "We've cleared a space on one of the crossings out front. If you can set the plow on the tracks so we can just hook up and go, that would be great. It'll save us time and that's the most important thing right now."

Mase went out at the fastest jog Arlen had ever seen him do. The sound of gears meshing told him that the truck was being positioned. Then, brakes squealing brought Arlen to the window to see what had happened. It was the ambulance from the hospital pulling in. Walter Allen and Frieda Zimmerman, both EMT's from the Fire Department got out and unloaded their gear from the back.

"Come on in here and tell us what more you need!" Arlen called. "We're getting the plow installed now and should be ready to go in five minutes."

"Has anyone called with an update?" Walt seemed extremely concerned. "The last radio call we got was that there was one definite fatality and two serious burn cases." While Walt was talking to Arlen, Frieda and Martin were transferring additional supplies from the ambulance into the Goose. Just then, three more figures came high stepping through the snow in the yard. The snow swirled in through the door as they entered. Lucas Chehab from the VoA radio station was followed by Mimi and Dee.

"Walt, I've got the status update for you. Michael Koester and Fredrich Klein have got second degree burns on their arms and upper bodies. Their team leader, Gustav Arndt, received third degree burns over most of his body and died shortly after the accident. They're not sure exactly what happened. Mr. Pierce sent word that he thinks they have enough pain killers to hold the two for about two hours. You'll need to get there before then or they may lose both of them to shock."

Walt took a moment to digest the news. His conversation with Dr. Adams when the call came in had been short and to the point. The hospital was full. If the patients could be transported to Jena safely then it was Walt's responsibility to make the call and get them there. This was a golden opportunity to start expanding medical care expectations to other sites. It looked like the parameters were a go for transporting to Jena unless something came up while they were enroute to Saalfeld. "Arlen, how long will the trip from Saalfeld to Jena take?"

"A normal run would be Saalfeld, Rudolstadt, and then to Jena. With the regular trains, that would be almost three hours in clear conditions, four in the snow, if at all. If the Goose works as well as our plans say she should, we

should be in Saalfeld in less than half an hour and in Jena by mid-afternoon. Say about two hours, including the time to load the patients," Arlen said.

Frieda slipped in from the rail yard, "All the supplies are loaded. We're set. Are we ready to go?"

The shop entrance door swung open again and a group of five track workers from the railroad congregated around the entrance.

"Were you all raised in a barn?!" someone yelled from the shop. A chorus of good natured "ja's!" came from the group, who were mostly down-timers. "Well, shut the door before you let all the hot air out!"

"*Jawohl*, we wouldn't want Julius to wander out into the snow." The old joke drew a sharp elbow to the ribs of the joker from Martin.

Julius quickly shot back, "At least they let me in the house now. You, they still keep in the barn." That drew another round of laughter from the track crew.

"If you are all done with your jokes, let's get loaded. Two men are waiting on our arrival. We've got a long day ahead of us. Anybody have anything else they need?" Silence greeted Arlen's question. "*Los gehts!*" They all filed out into the swirling snow in the shop's switching yard and started to board the Goose.

Mike settled into the engineer's seat. Martin took the conductor's seat in front of the passenger area. Mike commented, "You know, without the steering wheel, there's a lot more space here than you would think."

"I sure hope we're in time for those guys in Saalfeld," Arlen muttered.



The only sound as they worked their way through the tracks in Grantville was the hum of the Ford's engine and the clickety-clack of the wheels on the rail joints. The Goose was a ghost through the snow as they approached the station. The Goose slowed and Mark O'Reilly got out and threw the harp switch to move the Goose to the main track. He signaled with his kerosene lantern to have the Goose move onto the station main track. The Goose moved slowly over the switch and picked up Mark as they went by. Arlen then had Mike stop and Martin went into the station to get the train orders for the first leg of the trip. Mr. Nisbet, the railroad's general manager, was waiting inside to personally deliver the train orders.

"You're the only thing on the line today. We've cleared anything that might slow the run. You're authorized to run at whatever speed you feel is safe. Show me what the Goose can do and I'll decide how to present it to Mr. Lowe and to the board, but get those guys there safely. Remember," Mr. Nisbet added sternly, "the trip from Rudolstadt to Jena, it's all older strap rail. You'll have to watch the rail in case the weather has caused any problems."

With that, he handed Martin his Form 19. Nisbet's fervor surprised Martin. The railroad manager was known as a cold fish, but maybe he had a heart after all. Martin turned and headed out the door into the blowing snow.

When he reached the Goose, he looked up to check the sky. It was still snowing, and the sky was a uniform grey. The wind had started to blow the fallen snow into drifts in the yards around the station. Martin opened the door and got in quickly, shaking the snow off as he entered. "Here's the Train Order. We're the only one on the line. We need to watch the strap rail on the Jena line. They're not sure what this type of weather might do to it." He felt a little pompous repeating what the written orders said, but railroad regulations required that the engineer verbally acknowledge the orders from the conductor. Since he was acting as the conductor on this run, Martin wanted no questions that he had followed procedures.

Mike acknowledged the orders. Grinning, he added, "At least we don't have to watch for snake-heads like the old-timers did. With the welding and the short sections of real rail at the joints, it's a big improvement over the old style strap rail." Mike then let off the brake and the Goose started trotting its way to Saalfeld.

The silver paint scheme on the Goose blended in well with the falling snow. Only the headlights and red markers on the rear highlighted its departure through the Grantville yard. As it hauntingly glided out of town, the chatter inside the passenger area slowly died down. Everyone knew this was a mercy mission and thoughts of what lay ahead weighed heavily on them.

Mike asked, "What's the speed limit on this short section to Schwarza? The plow seemed to handle the snow in the yard pretty well."

"Hold it down to twenty-five. The wye at Schwarza's not too far and we may have to pick up updated orders there. I'll be glad when the signaling is upgraded and we don't have to get orders at every station." Arlen was concentrating intently on the track and the sounds and movement of the Goose, so Mike just nodded and went back to watching the track for snowdrifts.

Five minutes of waddling later, the small whistlestop station at Schwarza loomed up on their left. It was positioned inside the wye where the three tracks from Grantville, Saalfeld, and Rudolstadt joined together. Mike slowed down, but the station master was standing on the platform with a wooden hoop outstretched for Mike to grab. Mike rolled down the window, stuck his arm out and snagged the hoop. He handed it to Arlen and then

rolled up the window. As he brushed off the snow that had come in, Arlen took off the flimsy paper and read it quickly. "Mike, there's a track crew located telegraph break just south of Mile Post 3. Top speed five miles per hour between Mile Posts 2 and 4. Watch for workers and new rail along track. Saalfeld is expecting us in twenty minutes."

"You've got it, Arlen. If you see anything, let me know."

Walt called out from the back, "Any new word on the patients?"

Arlen yelled, "Nope, just slow orders for a crew fixing the telegraph. We should be in Saalfeld in fifteen or twenty minutes. Looks like the track's okay to there."

The track crew was relieved. They hadn't looked forward to working in the snow, if they could help it. As cold and blustery as it was, hands would freeze to rails or tools in minutes if they weren't careful. The news that they would reach the patients in Saalfeld quickly lifted everyone's spirits. As they passed Mile Post 2, Mike slowed down. The spray from the plow subsided and the Goose's waddle dissipated. . Everyone got a good look at where a tree had taken out the telegraph line as they drifted past. There was a bundled up figure with a lantern that waved the Goose through. As they passed, the three telegraph workers gave a muffled cheer that could be heard inside the Goose.

Arlen got up and walked back into the passenger area. "Walt, Frieda, we're about five minutes out. If there's anything you need to do before we arrive, now would be a good time to do it."

Frieda nodded, "Your guys did a great job and got everything set before we left Grantville. We just need our patients now." Arlen accepted the praise quietly and turned back for the cab. He gave Martin a pat on the back. "We'll have to let the shop crew know what a good job they did when we get back. You've really gotten them working together as a team." Martin smiled. In the guild, only a master might ever be thanked for a job well done.

* * *

The normal scene inside the foundry was like a vision from *Dante's Inferno*. Heat and smoke left everyone who wasn't acclimated gasping. The sparks and noise left visitors on edge.

The morning had started out quietly enough. It was Saturday and they were working a light shift. The railroad's experimental casting work was the only major job scheduled. Susan Swisher had hoped to get caught up on paperwork when the scream of the steam whistle alerted him to an emergency. As she bolted out of her office she could see the workers starting to gather in the casting area. There were three groups, each gathered around

an injured worker. Thadeus Zakrewicz, the shift EMT, came jogging out of his office, emergency gear in hand and yelled "What's happened?"

"I don't know, but it looks like it's in the casting area."

They got their first good view of the situation when they turned the corner between the open tool racks. Gustave Arndt was on the floor in the pour area with a small group gathered around his still body. It took Thad only a glance to tell that, if Gus wasn't already dead, he soon would be. He'd been burned severely over the top half of his body and his leather protective gear was covered with slowly cooling steel that still popped and sizzled. Susan did a quick pulse check, shook her head and they headed over to the other two burn victims.

"Susan, take these keys and go back to my office. I'll need the full emergency kit and what morphine that's there. You know the drill. Anything else you might find that could help, bring it along." Knowing that there would be questions later about what had happened, Thad decided to ask while the events were still fresh in everyone's minds. "Anybody see what happened here?"

"I did, Mr. Zakrewicz. They were all set up to try the test casting for the new turntable support ring. Gus was supervising the work and Michael and Friedrich were making sure the mold was secure. The crane operator called out to ask if they were set. It sounded like Gus said, 'Go,' gave a hand signal to start, and then he was lying across the mold. Michael and Friedrich tried to pull him back but all they got for their efforts were burns. Gus didn't make a sound at all."

"Anybody else?"

"Just like he said. I saw Gus wave his hand like Jaimie should start pouring. Gus had an odd expression on his face, took two steps forward, and seemed to be reaching for something in the pattern area. Then the pour started and Michael and Friedrich were trying to help him."

There were other nods of agreement but no more comments. Thad was starting to get a suspicion about what had happened. The lack of response to the initial burn and the collapse were key indicators. "It sounds like Gus may have had a stroke or a heart attack."

He was interrupted by the sound of someone getting violently sick across the room. The crane operator, Jaimie, was down on his hands and knees, trying to stop what were now dry heaves.

"Jaimie, are you all right?" Thad asked. He knew he would probably need to send Jaimie to see a counselor after this was all over. Thankfully,

someone had found a blanket to cover Gus.

"It was my fault, Thad. I thought Gus signaled to start."

"He probably did, Jaimie. It looks like he may have had a stroke and was gone before he even started to reach for the pattern box." The dazed look in his eyes lifted a bit. Jaimie was young and, with help, should recover. Thad turned back to his two surviving burn patients as Susan and Gunther returned with the needed supplies.

"Michael, Friedrich, we're going to get you to a hospital as fast as this weather permits. Right now, you're not feeling much pain because you're in shock. I'm going to have to get your leather gear off so that I can assess the extent of your injuries. Before I do that, I'm going to give you some morphine and you'll be out like a light in a few minutes. You won't feel the pain when I start to work. Your families have been called." He looked at the crowd and got an affirmative nod from Jim Pierce, who had just arrived. "And they'll be here shortly," he continued. "Anything you want me to tell them when they arrive?"

Michael whispered, "Tell my wife, I love her and to take care of herself. The safe box is . . ."

Susan interrupted. "You can tell her that yourself tomorrow at the hospital. This looks bad and will hurt like hell for a while, but you definitely aren't going to die."

An hour later, after the two men had been freed of their protective gear and the wounds cleaned as well as conditions allowed, Thad turned to Mr. Pierce, and asked, "What's the word on transportation? Can we get them to Grantville okay?"

"I talked to Dr. Adams. He wants us to send the two burn cases to Jena if we can. The trauma folks with burn training are in Jena for a meeting on the new trauma center and he's worried that all the flu cases they've got right now could hurt their long term survival chances."

Susan turned white and looked like she might faint. Jim Pierce hurried to add, "It's not as bad as it sounds, the railroad's been contacted and is sending a special train that will take them directly to Jena and should be here anytime. Grantville's sending their two EMT's with burn experience and a fresh supply of morphine. They think they can get everyone to Jena before nightfall. Can we move them to the station now?"

Thad considered the situation for a moment. "We're set here. They're both stabilized and the morphine has them out. I'll need eight strong, steady carriers to get them transferred to stretchers and carried to the station. If we

cover them with enough blankets, the five minute trek shouldn't be too hard on them."

Mr. Pierce called out, "I need eight volunteers to move the injured!" Twenty hands shot up and in two minutes the two injured had been gently placed on stretchers and the carriers were ready for the trip to the station. Just then, a strange noise startled everyone. In the ensuing quiet, Mr. Pierce said softly, "I think your ride's here now!"

* * *

On the outskirts of Saalfeld, Mike hit the button on the electric horn Arlen had installed. The loud blasts of "*aahhOOOOOgah*" startled the crew in back and announced their arrival to the whole town. As soon as Mike slowed down for the red approach signal, one of the track crew jumped off and slogged through the snow and tried to get throw the switch for the depot's turnaround wye. It wouldn't budge.



"Damn blue ice's frozen the switch!" Somebody else jumped out with a sledgehammer and broom and between the two of them, they had the switch cleared in less than a minute. Mike brought the Goose up and they reboarded on the fly. They repeated the process at the next leg of the wye and then backed down the track to the depot. They were greeted by a procession from the foundry. A figure broke out of the crowd and stumbled through the snow to the Goose. When she got closer, Walt and Frieda both recognized Susan Swisher. Even with all her winter gear on, nobody else in Saalfeld was that short with long red hair.

"Walt, Frieda, you have superb timing. We were just bringing the two patients to the depot to wait for you. Are you ready to board them now?" Susan asked.

"We're all set," answered Walt, "We've got four sets of seats set up to be temporary berths. We can just set the stretchers across and not have to transfer them at all. Are there just the two?"

Susan nodded. "Yeah, we lost Gus before the accident. Thad says it looks like he may have had a stroke and was dead before Michael and Friedrich tried to save him."

The next minutes were spent in organized chaos trying to get the stretchers in without jarring the patients. Once in, they secured them to the improvised berths with rope.

Mr. Pierce approached the railbus. "I don't know what this thing is but it's the prettiest thing I've seen since my wife had our last kid. Who's in charge?" Arlen pointed at Mike, Mike at Arlen, and then they both looked at Martin.

After a short, pregnant pause, Arlen said, "I designed it, Mike's running it, and Martin built it."

"Well, thank you. All of you. I don't know how I'll ever be able to repay you, but please, get these guys safely to Jena. They've both got families that are depending on them. Will you have room to carry five other passengers? Susan promised them she'd try to have the families there at the hospital when they woke up. I'd also like to send Thad and Susan along to help care for the injured. Can the—what did you call it—the Goose handle that big a load?"

"No problem. I know Walt was a little concerned that he and Frieda might be hard pressed to handle two serious burn cases by themselves."

"How soon can you get them to Jena?"

"If all goes well, we should be there in less than two hours." Arlen was confident. "The Goose is running well and we've brought along tools and help in case we run into any unexpected problems."

"Under two hours to Jena in this weather? I didn't know the railroad had anything like this. Where's Hugh been hiding it?"

"This is her shake down trial. We finished with the plow this morning after your call came in."

"Just keep up the miracles, and again, thanks." After shaking their hands, he turned and started to clear the crowd back from the tracks.

Since he'd been appointed as the conductor for this trip, Martin went into the station. There were orders waiting for them as far as Rudolstadt. All

they said was, "Track now clear, proceed at best safe speed to Rudolstadt. Pick up new orders there. Signed, Nisbet." When he got back to the Goose, the crowd had grown, but Mr. Pierce was keeping them back at a safe distance. Martin boarded, gave Mike the orders and checked with the medical team.

"Are you and your patients set?"

Walt and Thad answered together, "All secure. Ready for you."

"Mike, signal the crowd and let's go." The Goose let out with a raucous *aahhOOOOgah* and started waddling down the track. A couple of kids in the crowd imitated the horn and started flapping their arms as the Goose left the station, with the gathered people waving and cheering. As they left the well wishers behind, Thad asked, "Where did you get that horn, Arlen?"

"On the bottom of a shelf over at the old auto parts store. They had a dozen of them and I bought all of them. If the Goose is successful, I wanted all the railbuses to have a distinctive warning horn."

"I don't think anyone here will ever forget it," chimed in Susan. "I jumped three inches when you announced your arrival with it."

Everyone settled down for the ride to Rudolstadt. In ten minutes, they were passing the Schwarza station again and the signal was green for the track to Rudolstadt. Mike hit the horn to announce their arrival but the stationmaster just waved them through. As the Goose waddled through the switches for the wye, Friedrich tried to roll over and moaned when the blankets restraining him rubbed his arms. Thad checked the dressings and drip bags. "I think we better break out the morphine you brought, Frieda. These doses are starting to wear off. They're both in better shape than we originally thought." After a bit more morphine, Friedrich settled into a light sleep.

Once they were past Schwarza, the grade started a slight rise for the route to Rudolstadt. The plow was throwing a bow wave of snow to each side as the Goose waddled along at a steady twenty-five miles per hour.

"Everything's working fine, Arlen. If I keep it at the high end of each gear, it seems to cut back on the side to side motion. I think you've got enough power to even pull a trailer for freight." Mike was smiling. "I've hardly had to use any sand so far!"

"Don't jinx it, Mike. The worst stretch is on the far side of Rudolstadt." Even though he was trying to sound pessimistic, Arlen could not help but feel optimistic. The Goose was performing far better than he had hoped.

Mike concentrated on potential snow drifts. They were almost in sight of Rudolstadt before the first serious problem area was encountered. The track crossed the corner of an open field where the wind was being funneled to the opening. Mike geared down and started spreading sand. As they hit the drifts, the Goose shuddered as it carved the drift and then broke into the clear fifty feet later.

"That wasn't bad at all," remarked Arlen. "Any problems in the back?" Martin gave a thumbs up after checking with the EMT's.. "We're just about at Rudolstadt. We'll stop for orders and a quick break. Facilities are outside, behind the station. The last stretch will be the toughest, so use the opportunity if you need it."

Ten minutes later, the semaphore signal for Rudolstadt station shone bright red through the swirling snow. Mike pulled up in front of the station and set the parking brake. Walt and Thad quickly busied themselves checking that the ropes holding the stretchers hadn't loosened.

Arlen called out, "Rudolstadt, two minute break!" He turned to Mike, "I've always wanted to do that since I was a kid. I'll be back in a minute if you can hold it that long."

Mike had a quick come back, "I wasn't the one who drank two cups of coffee before we left. I'll mind the store until you get back. Make sure you remember to pick up the train orders!"

Arlen headed out behind the station. By down-time standards, the facilities were luxurious, with ventilation and varnished seats. While the cold kept the odors down, they were unheated, so no one lingered. Arlen was quickly back inside the station to get the orders for the remainder of the run but Martin had gotten there before him.

"What have you got for us, Thomas?"

"You aren't going to like them. We've had two breaks in the telegraph line between Jena and here. Before the wires went down, the track crew at Rothenstein signaled that they had ten inches of snow, with drifting. They were patrolling the tracks on horseback but they haven't reported back yet. I'm giving you cautionary orders to proceed at best safe speed with a danger warning for snow and debris beyond Mile Post Twenty-Two. There are some deep cuts beyond Kahla and Rothenstein and you could get some serious drifting there. The wind's in just the right direction for problems on that stretch. Good luck and Godspeed." With that, he shook their hands and went on to change the signal to green.

When Arlen and Martin got back into the Goose, they were covered with a light covering of fine snowflakes.

Martin went into the Goose to check on the passengers. "How're they doing?" That was just checking their vital signs. "Michael is stable and in remarkably good shape, everything considered. Friedrich got a deep burn on the back of his neck and his blood pressure's been fluctuating a little, but if we get them to Jena soon, they both should be okay. How's the situation looking?"

"This last stretch will be the most difficult. Once we reach Rothenstein, the tracks appear to have some problems but the track crews haven't been able to reach the trouble area. At best, we may have a tree or two down, more likely, the tracks are drifted over." Mike was climbing back in the cab. He looked like a miniature polar bear with all the snow covering his winter gear.

"All aboard!" called Martin as Mike shifted the Goose into first gear.

Arlen climbed into the fireman's seat, rechecked the passenger compartment and then told Mike, "Let's roll! I've got a wedding to get back for tomorrow."

The track was aligned for departure. As they rolled out of town, Mike and Arlen both felt a change in the Goose's performance. After a few moments their worried looks slowly changed to comprehension. "We're on the older strap rail now! You can hear the different clatter as we cross the joints."

"I just hope we don't have a problem with this rail, Arlen. The snow looks to be slowing down, but they've had more here than we had in Grantville." The window wipers were laboring to keep the windows marginally clear. Mike rolled his driver's side window down and tried to clear the build up he could reach. "At least this is easier than a regular truck. I don't have to worry that I'll swerve into the next lane." Just then, the plow of the Goose found a small drift and Mike got a face full of snow.

"Looks like I'll have a simply abominable best man if you keep that up!" roared Arlen.

Sputtering and cleaning snow from his eyes, Mike groaned at the miserable pun. "Just wait until that first kid arrives, Arlen. Paybacks are hell."

The Goose made steady progress. Before they knew it, the station at Kahla was in sight. It was just a whistlestop station and the signal was green so Mike didn't even slow down. The problem areas were beyond Rothenstein. Mike was a study in concentration as he tried to watch for any drifting and

gauge when the use of sand was needed for traction. The passenger compartment was staying nice and toasty with the passenger's body heat and the stove putting out its share of heat, too. Both patients were quiet. Their families were still in a daze from what had happened, but were starting to ask Walt and Susan questions about the future.

"When will my Friedrich be back to work? We don't have much money to pay the hospital," pleaded the injured man's wife.

"Don't worry, Anna, the company's paying all the bills. Mr. Pierce told me so before we left, and his pay's continuing, too."

The smile Susan got from her seemed to light up the whole compartment. "Friedrich told me this was a good job, but now I know it has good people too. *Danke!*"

The Goose rounded a curve and the mounted track crew came into view at the Rothenstein station. Mike slowed to a stop to let Martin check on the track's status.

Two minutes later, Martin climbed back in looking grim. "The crews were able to locate the breaks in the wire. The snow had broken off some overhanging limbs. They're going to wait until the weather clears before fixing them. Our problem is that about four miles outside Jena, there are a series of three cuts that are starting to drift shut. We may have to do some serious snow bucking to open the route."

"Well, that's why we waited for the plow," said Mike. "I'll watch the speed and we can have the boys in back get out and check each cut before we try to break through. Anything else?"

Martin shook his head no, sending snow all over the cab.

"Then let's roll!"

Arlen got up and went to discuss the situation with Walt, Thad, and the track crew. "Martin says we're about thirty-five minutes running time from Jena, but we're probably going to have to plow through some big drifts. Walt, Thad, I'll need you to make sure the patients are braced securely. Mark, you and the rest of the crew will need to get out to check the drifts for any debris that might have come down the sides of the cuts and let Mike know how big a drift he's facing. We'll probably need to take a couple of shots to get through each one if the track crew's description was accurate. Take all the shovels and picks out and pass them out when you get off. We'll need to clear the rails after each shot to reduce the chance the Goose jumps the track from the snow build up."

The entire track crew looked like they were dealing with a befuddled spinster. "We'll handle it, Arlen. We've done this before. Don't try to teach us how to suck eggs!" The good natured laughter that followed helped quiet Arlen's nerves.

About ten minutes later, the first cut came into view. The drift was as high as the top of the plow. Mike slowed down, shifted into first gear and inched up to the drift.

"Time to earn our pay, boys!" Mark called.

The track crew piled out to get their tools and start checking the drift. Inside a minute, Mark was back in the Goose grinning from ear to ear. "It's just a narrow wall, taller than it is wide. You should be able to bust right through. We'll stay outside, just in case you need a second shot, but it should go on the first try." Mark got out and waved the crew back up the track so they wouldn't get showered with snow.

Mike let out the clutch, applied sand, and nudged the drift. He almost broke through on the first try. He backed up fifty yards, waited for the crew to clear the rails, and then came at the drift again, a little faster than before. With hardly a shudder, the Goose broke through in a cloud of snow. As he stopped a hundred feet past the drift, Mark and the track crew hustled down the cleared track to reboard the Goose.

"That was easy," remarked Thad.

"Don't count your chickens, yet," said Arlen. "We've still got two more to go." Within a half mile, the next cut appeared and the drift was definitely more formidable. Mike made a half-hearted attempt at the drift and actually cleared five feet before he was forced to stop. The track crew got out and repeated the drill. No debris was found, but this time, the drift was almost thirty feet wide. After the rails were cleared, Mike backed up and made a run at the drift. There was a jolt as the plow struck, but neither patient was disturbed. When the cloud of snow from the impact cleared, almost twenty feet of track was cleared. The Goose pulled away from the snow bank it had created and the track crew fell to with gusto to clear the rails and the packed snow at the front of the pile.

After five minutes, the crew cleared out and Mark signaled for Mike to try again. When the plow hit the snow this time, a huge pile of snow flew up and landed on the roof and behind the railbus, but the Goose broke through to the other side. The track crew scrambled over the snow left on the tracks and reboarded.

Inside, thermoses of hot coffee were passed around. Everyone was tired, but cheered by the fact that only one cut was left.

The last cut appeared and someone in the back choked and sprayed coffee everywhere. A whispered, "*Gott in Himmel*," was the only comment as the extent of the drift became visible. The cut was more of a ledge cut into the side of the slope. The track was on a shelf extending for a hundred yards with a steep drop off on the left and a thirty foot high stone face on the right. Amazingly, the tracks were clear, but for almost the full length of the shelf, a ten foot ledge of snow overhung the rail bed. The snowfall had slowed to just flurries and the smoke from Jena was visible about two miles in the distance.

"What now, Arlen?" asked Walt.

"I don't think we have a choice. Everybody unloads and, quietly, walks to the far end of the cut. If we can, Mike and I will try to get the Goose past. If we don't, Martin can send someone to Jena for horse litters for the patients. That may take an extra hour, but they'll get there. The track crew can work at digging us out. If we make it, we reload and are in town in five minutes. If anybody else has any better idea, I'm open to suggestions."

Silence greeted his request.

Thad broke the silence. "Okay, then. Let's get our two patients bundled up again, just like we did for the trip to the station. While we're doing that, Mark, why don't you have your crew carry their tools down past the drift? Then come back and we'll all help get the patients moved."

The next minutes went quickly as the passengers and patients were all walked or carried past the drift. Once they were safely set on the other end of the cut with Martin, Mike turned to Arlen and asked, "Shall we do it fast or slow?"

"If we do it slowly, it's just about sure that we'll get trapped and they'll have to send for the horses. If we go quickly, we may stay ahead of the snow as it falls. Either way, I don't think we're getting back to Grantville, tonight."

"Fast it is, then. Hold onto your hat, and buckle in. This could get hairy!" Mike tapped the horn once to let the passengers know he was ready. Mark signaled back with his lantern to come ahead. Luckily, the track was straight here, so Mike backed up the Goose for a running start. One more tap on the horn and the Goose was off.

As it picked up speed, Arlen read off the speed for Mike, "Ten, fifteen, twenty, thirty, thirty-five . . ." They passed the start of the overhang and almost immediately snow started to spray in all directions. The plow struck a column of snow when they were about a third of the way through the cut. The

ensuing snow cloud hid the Goose from the view of the small group huddled beside the tracks. The snow ledge started to collapse from the far end. Just then the Goose broke into the clear, and, like a surfer riding the Banzai Pipeline, the Goose stayed just ahead of the falling snow and cleared the cut.

Mike lay into the horn and the call of "*aahhOOOOgah*" resounded across the hillside. About three hundred yards past the group, the Goose finally stopped in a cloud of snow and sparks from the braking wheels. As the screech stopped, Arlen could be seen pounding Mike on his back in celebration. The Goose then backed up and the group jumped back on board as quickly as they could with two litters. Five minutes later, with the horn echoing off the city walls, the Goose entered Jena with its patients.

The Goose was greeted by a cheering crowd assembled around two waiting ambulances. A space had been cleared of people from the station platform to the vehicles and had been shoveled and swept clear of snow. There were two gurneys with attendants waiting for the patients. A group of very important looking people were off to the side. As Walt and Thad got out to make arrangements to transfer their patients to the gurneys, Beulah McDonald and Patrick Onofrio hurried forward to meet them. It had been Beulah's call that the center could handle the burn patients. She wanted to make sure that they got the best care right from the start. The transfers to the ambulances from the Goose went smoothly. Patrick rode in the back of one with Thad and Walt and Frieda rode in the other. Susan stayed with the families to help get them lodgings at a local inn before they went to the medical center. As soon as the ambulances left, the crowd poured into the cleared area to get a better view of the Goose and its crew.

A tremendous cheer went up when Mike, Arlen and Martin got out and the group of dignitaries descended on them. Wade Jackson started in with a speech immediately. "Congratulations on a magnificent accomplishment. Your efforts to . . ." Arlen smiled and waved and tuned out the rhetoric to check on what was happening with the rest of his passengers. The stationmaster was leading the track crew over to a nearby *Brauhaus* for some serious toasting. The ambulances had departed and Beulah and Susan were shepherding the families onto a wagon to take them to the local inn. Beulah caught Arlen's eye and pantomimed for him to wait and that she'd be back in thirty minutes. The crowd noise drowned out whatever she might have tried to yell.

Thirty minutes later, the speeches were still going strong. Every dignitary in town wanted to be heard and each speech was an agonizing

rehash of the previous one. At one point, Arlen caught himself starting to nod off and looked over at Mike. Mike seemed to have perfected the art of sleeping with his eyes open. Arlen started searching the crowd and finally saw Beulah approaching. When the current speaker paused to draw a deep breath, Arlen quickly broke in, "I'd like to thank all the wonderful people of Jena for this magnificent reception. I see my contact from the medical center coming and I must check with her on my passengers. My associates, Michael Lund, who was the engineer for the trip, and Martin Erlanger, who helped build the Goose, will be able to stay, but I must make my farewell."

Mike turned to Arlen and muttered under his breath, "I'll get even!" Martin just stood back quietly and enjoyed his fifteen minutes of fame.



Arlen chuckled and turned to meet Beulah. She gave him a huge hug. "They both should recover. Walt and Thad did a great job stabilizing them for the trip. I know we could have gotten them to Grantville faster, but after we heard Gus had died and the others were not as serious, Dr. Adams and I felt

that the threat from all the flu cases at Grantville was the more serious threat to their survival. This also gives us a chance to show the world that Grantville isn't the only place to get medical care."

Just then, a roar from the crowd caught their attention. Mike was just finishing his short speech with ". . . he got betrothed in June and his bride-to-be is tired of waiting. So just be here at dawn with your shovels!" He turned to Arlen with the biggest grin possible.

Arlen told Beulah, "I think I'm in trouble. I better get back to see what Mike's done to me now. I'll stop by the medical center as soon as we're done here." As he made his way through the crowd, all the men were shaking his hand or slapping his back. "What did you do to me now, Mike?"

"Paybacks! I told them about you wanting to get back for your wedding. There's no way to get the track cleared so that we can return tonight. The students have volunteered to start out early in the morning to hand shovel the tracks as your wedding present from the school. Now smile and accept your bachelor party!"

As the crowd started to lift Arlen and Mike on their shoulders, Martin waved them off and yelled to Arlen, "I'll take care of the Goose. I'll stop by the medical center when I'm done." All Arlen could do was give him a thumbs up. As the crowd headed for the street Arlen yelled to Beulah, "Radio my fiancée! Tell her I'll be there tomorrow. I'll stop by the medical center before I go!" His voice raised in pitch as the wave of people moved him away from the Beulah.

"Good luck! I'll make sure she gets the full story!" Beulah walked slowly away, chuckling as she went.

Arlen let out a groan. "She's gonna kill me!"

One of his supporters informed him, just loud enough to be heard over the crowd, "Only if the hangover from our party for you doesn't get you first!"

* * *

Early the next morning, still dressed in his shop coveralls, Arlen slogged through the snow up to the medical center front door, bleary eyed and a day-old beard on his chin. Mary Pat Flanagan spotted him first and came over with a sympathetic grin. "You look like you could use a good cleaning up and a gallon of coffee. Follow me. We've got a small shower facility for the staff down the hall. Leave the dirty clothes on the bench and I'll have one of the orderlies freshen them up while you're cleaning up."

Thirty minutes later, after a shower, shave, and a change of clothes, Arlen came back to the main reception area. "Thanks, Mary Pat. That sure makes my morning! How are Michael and Friedrich doing?"

"Their prognosis looks good. Thad did a great job on the initial response. Walt and Frieda will be returning with you but Thad and Susan are planning to stay over an extra day or two to help the families. You might want to go get Mike and Martin and get the Goose ready for your return trip. The half of town that wasn't celebrating with you boys last night left two hours ago to start clearing the tracks."

"Any idea where my best man and my conductor might be hiding?"

"Try the lounge. Mike came in an hour before you, got cleaned up, said something about 'needing to drive,' and curled up on an old sofa in there. His snores have been shaking the walls since then. Martin came in late in the evening. He got a good night's sleep and left about the time Mike arrived. He said something about getting the Goose turned around and ready for the return trip this morning."

"I'll take you up on that offer of coffee. Two cups, black, please, so I can get Sleeping Beauty in there moving. I've got a wedding to get to."

"Coming right up! I'll meet you in the lounge with them."

After their morning coffee roused them a little, Mike and Arlen went to see the patients. Walt and Frieda were in the room when Arlen and Mike arrived. The families crowded around to thank them again for helping save their loved ones. Pleading the pressing urgency to get back for the wedding, Mike and Arlen gathered up Walt and Frieda, took their leave and headed for the station. The ten minute walk in the brisk morning did as much as the coffee to wake them up.

"I must have sipped that same beer for two hours last night. I'm tired but not hung over," said Mike, disgustingly clear eyed.

Arlen groaned holding his head. "I wasn't so lucky. Everyone kept insisting on buying a round for the hero and groom. If I don't see another stein of beer, it will be to soon."

"You can sleep it off on the ride back. With a little luck, the anesthesia won't have worn off before Mimi kills you for missing the wedding."

When they reached the station, the stationmaster said, "The Goose is all preened, fueled, and ready to go. Herr Erlanger took care of that when he showed it to Count von Sommersburg last night."

At the mention of the Count's name, Arlen swung around, "Who did you say was here?!"

"Count von Sommersburg. He was here for a meeting with some engineers at the University and he was all over the Goose with Herr Erlanger after you left yesterday. He gave strict orders that everything possible be done to get you back to Grantville in time. The tracks should be clear by inside the hour. Your track crew will go back on the regular freight tomorrow. Herr Erlanger is with the Goose now."

Arlen went to smack himself on the forehead but thought better of it, "How could I let a chance like that to promote the Goose slip by?"

"Don't worry, Herr Goss. There were a lot of telegraph messages going north after he was done last night to someone very important. The count looked very pleased when he left. I think Herr Erlanger did a very good job. He seemed very pleased too, when he left."

"Wait and see, Arlen. I think the run we made was promotion enough. Martin's tour may be the clincher. He knows the Goose as well as you do."

"I hope you're right." The previous day's adventures and the evening's festivities were starting to tell on Arlen. He looked like a feather could knock him over. With a visible shake, he cleared his mind to organize his thoughts and changed the subject. "You said we have about an hour yet until the tracks are cleared?"

"*Ja*. The crew has a portable telegraph with them and they've sent back reports on their progress. Everything is going smoothly."

Walt interrupted. "Frieda and I have to secure some gear we left with the ambulance. We'll go get that and be back in half an hour."

Mike and Arlen were left standing on the platform with the stationmaster. The quiet was then broken by a noisy rumble. After a few seconds, Arlen asked, "Anyplace a person could get a light breakfast nearby?"

"I live here above the station. *Meine Frau* would be happy to fix you gentlemen breakfast. We serve food for any passenger the train might have when it stops and we feed the crews. Herr Erlanger ate earlier. Just follow me!" Hurrying inside and up the stairs he yelled, "Gertrude! I need two more breakfasts for *Herren Goss* and *Lund*. *Macht schnell, bitte!*"

Gertrude came into the common room twenty minutes later beaming and carrying an armload of dishes heaped with eggs, bread, and sausage, and two beers in her free hand.

"You eat! You have a big day ahead!"

"And hopefully a bigger night," quipped Mike.

Mike and Arlen set to with an unexpected gusto. Sixteen hours between meals required some serious eating. As they mopped up the last of the eggs with bread slices, Arlen asked, "How much do we owe?"

"*Nein, nein!* The railroad will cover for your help."

"*Danke, Frau Schimmel!* That's the best wedding breakfast a person could hope for." As they pushed away from the table, Mike glanced out the window. Martin had the Goose parked in front of the station warming up, shining like a new silver dollar in the early morning sun. Walt, Frieda, and Martin were already waiting in the passenger compartment.

Mike got an ice cold splash of water down his back from an icicle hanging from the station's overhang. He let out a yelp when it landed. "Hey, Arlen, the sun's out. Maybe we can get back in time!"

The stationmaster came running up and gave Arlen his train orders. "Must not forget these!"

All the orders said was, "Highball it! Signed, Curtis."

"I think she's anxious, Arlen."

"No kidding. Let's go!"

They climbed into the Goose, Mike hit the horn and headed for Grantville. As they approached the cuts outside of town, Mike sounded the horn again. A cheer greeted them as they reached the first cut. A group of shovelers was returning from further up the track with shovels over their shoulders. The students in the group were singing a bawdy song and Arlen blushed beet red when he finally caught what the song said. Mike slowed down and rolled down the window as the track boss came up to the Goose.

"All clear to Rudolstadt. Just watch this last group. After them, you're clear."

"Okay, tell everyone thanks. I'll get him there on time." Mike rolled up the window and with a strident *aahhOOOOgah*, the Goose continued its journey. While Mike ran the Goose, Arlen talked to Martin about the meeting with the count.

"He wanted to know everything we have planned. He was especially interested in the plans for a steam-powered Goose. I told him that the Steam Engine Company should have the new steam design ready by the time we move to the new shop in Saalfeld. He also wanted to know if we could make the carbody larger. Something about living quarters during campaigns. I told him the new steam design should be able to handle that. I've already drawn plans up as you asked."

Arlen sat there for a minute and digested the information. "It sounds like we've got someone very interested. When I get back after the honeymoon, we'll start building the new steam power plant prototype. Right now, I need some shut eye." He got up and headed back to the empty seat next to Mike. Inside a minute, he was asleep.

The ride back was through a winter wonderland. The trees were all draped in a thick blanket of snowy boughs and the countryside sparkled with its clean white coat. There was some light drifting, but the plow blew through it, leaving silver clouds of snow. The sun had some warmth to it and was already starting to melt the early snowfall. As they rolled along, Mike had a chance to watch the scenery more than he had the day before. The tree branches were hanging low with all the snow that had fallen. "Looks like the AT&L linemen will be busy the next few days repairing wire." The only comment he got from Arlen was a change in the timbre of his snoring. Mike settled in to make sure he got back to Grantville in time.

The wedding was scheduled to start at one in the afternoon. The Goose arrived in Grantville at a quarter to twelve.

The cheers were deafening as everyone got out. Martin got the keys, and told them he would bed the Goose down. Ed Piazza, Frank Jackson and Dr. Nichols headed the reception committee.

Frank pulled Arlen aside, "The truck will get you to your folk's house so you can clean up and change and then it'll take you to the church. Mr. Piazza and I will see you later at the reception. Good job!" With a solid pat on the shoulder, he propelled Arlen towards the truck with Mike Lund following close behind.

The next hour went by in a haze, but at five minutes to one, Arlen and Mike were delivered by their driver to the front door of The Church of Christ. Pastor Curtis came out to chivy them inside. "Are you all set? Got the ring?" he asked.

Mike's face looked like he'd been struck by club. Arlen choked and turned white, "After all the warnings!" He was hardly able to get the words out.

Mike laughed. "Gotcha! I told you about paybacks. I've got them right here." He pulled the matched rings from his pocket.

The church was packed Then the music started. Dee was first through the door in her peach-colored bridesmaid outfit. After she reached the front of the church, she smiled at Mike, turned to the other side of the altar and took her place.

Then the "Wedding March" began. Mimi entered. She had on her mother's white silk wedding dress. She had added a knitted white shawl that Antanette Tranis had made especially for the occasion. Antanette had recently arrived with her family from Lithuania. Her husband was one of the machinists at Vulcan. Arlen's heart felt ready to burst; the soft colored glow from the stained glass windows only enhanced the glow from Mimi. The pride and love in her eyes told him everything was right with the world.

Afterward, Arlen swore that was all he saw until Rev. Curtis said, "I now pronounce you husband and wife. Ladies and gentlemen, I present Arlen and Mimi Goss. You may kiss the bride!"

As they started to walk down the aisle, the organist started to play the recessional march. As they reached the front doors, Mike turned to Dee, "What's that tune?"

"It's something one of the Stone boys suggested. Mimi and I had him play it for us and it sounded very good. Some march from Ralph Bakshi's movie *Lord of the Rings*."

The crowd started to file by, Frank Jackson shook Dee's hand. "Good choice of music, gets the crowd out quickly!" Chuckling, he congratulated Arlen and turned to Mimi, "Good man you've got there. He's really going places!"

Hugh Lowe was next and also added his well wishes. "See me after the reception!"

Later that evening as the reception was winding down and the presents were being readied for opening, Frank Jackson, Ed Piazza, and Hugh Lowe took Arlen aside. "You sure showed what that Goose can do," said Hugh. Frank and Ed nodded agreement and grinned. "Mr. Jackson here approached me last night after you got to Jena with some questions and this morning, Ed here brought me a message from the Transportation Minister. Count von Sommersburg wants a special Goose for Gustavus. It was a good thing that message came in Morse code. Ed almost died laughing when the radio operated finished translating. Can you believe it? Just like one of the old rail baron's palaces on wheels. He said he needs something comfortable and regal to get him quickly around in all types of weather."

Ed started to chuckle. "Once word gets out that Gustavus has a private railbus, I'll bet that every nobleman will want one, too!" A light seemed to go off for Ed. "Every politician, too, once campaigning starts. The old whistle-stop politicking will return! Arlen, I'll bet even Wettin gets with you after you get back from your honeymoon."

Arlen reached for a chair and dropped into it. "We may have to scrounge walnut for the bodies and old trucks for the frames, but we'll do it!" The rest of the conversation was lost as Mimi tossed her bouquet. Ed Piazza, Frank, and Hugh offered a toast, "To Arlen and Mimi Goss, a long, happy and fruitful marriage." Ed Piazza gave Arlen a mischievous wink, and took a drink.

With visions of the future, Arlen kissed the bride and whispered, "And to the Goose, the founder of our future!"

* * *



Sure Thing

Written by Kerryn Offord



***Sunrise, Monday, March 13, 1634,
Magdeburg***

Elisabetha Schmelzer was sure the shadow walking behind her was a man, and that he was following her. Every time she stopped, he stopped as well. She wasn't quite ready to panic just yet, but a woman alone in this area at this early hour of the morning wasn't safe. She loosened the knife she kept in her sash, and considered her options. Around the next corner, if she put on a quick burst of speed, she should be able to get to the alleyway before whoever was following turned the corner. If she could hide in the shadows, then maybe she could lose him.

She stepped round the corner, and then ran as quietly as she could for the alley. Once there she crouched in the shadow of a doorway, her knife ready.

Elisabetha was tempted to poke her head out to see if she could see her follower. *No, it's safer to wait. I'd surely hear him if he comes down here.* She settled down to wait.

* * *

The movement and rustle just about caused Elisabetha to jump out of her skin. But it was only a black kitten playing with a bit of colored paper. Elisabetha grinned. Then she concentrated on the piece of paper. It looked like a banknote. She leapt to her feet. Well, she would have if her right leg hadn't fallen asleep. Instead she lurched to her feet, making a noise as she did so. The kitten took fright and was off in a flash.

Elisabetha picked up the piece of paper. It was a bank note. A ten dollar note. Then she saw the other zero. A hundred dollars. That's nearly a week's wages at the laundry. She searched the alleyway just in case the owner was looking for it. There was nobody. So she wiped the note as clean as she could and put it in her purse. She looked around to see if she could see the kitten who had found her this prize, but it was long gone.

The sun was getting higher in the sky and more people were on the streets, so Elisabetha stepped out of the alley and continued on her way home. She needed to buy food for the day and then she needed to get some sleep. The nightshift at the laundry paid well, but it was exhausting work.



* * *

Johann Roeloffse sat at his usual table in the café just down the road. Whenever Elisabetha had a spare dollar she bought a number in the lottery from him. She adjusted her shopping bags and felt in her purse. The coins didn't add up to enough for a ticket, but she did have the banknote she'd found earlier. Feeling lucky, she walked over to Johann with the banknote ready. "Could I buy a number for today's draw, please?"

Johann smiled and pulled out his policy book. "Of course you can, Elisabetha." Then he saw the note in Elisabetha's hand. "A one hundred dollar note? Elisabetha, what've you been up to?"

"I found it," Elisabetha protested. She was pretty sure she knew what Johann thought she had been up to. There weren't that many things a girl could do that would result in being paid with a one hundred dollar note. "Honestly. I was walking home from work when I thought I was being followed. So I slipped into an alleyway and hid. A kitten was playing with it. Look. You can see when he chewed on it."

Johann examined the note. "I don't suppose you have anything smaller? I don't have that much change." A sneaky grin appeared on Johann's face. "Hey, why not buy a hundred tickets? It's not as if they'll cost you anything. It's all found money."

Elisabetha shook her head. "It's the smallest I have, sorry. And it might be found money, but there are other things I want to buy."

"Well, what about fifty tickets? I can give you fifty dollars in change. Go on, girl. Think what you could do with your winnings."

"I don't know. Fifty dollars is a lot of money to gamble."

"Sure it is, but it's not *your* money. It's found money, so you're not really gambling. Go on, Elisabetha, take a risk."

Elisabetha sighed. "Oh, very well. Fifty tickets, please."

Johann opened his policy book and got his pencil ready. "You won't be sorry. What numbers do you want then?"

Elisabetha looked around searching for inspiration. The only number she could see was the date on the paper Johann had been reading.

"Thirteen."

Johann wrote out the first ticket. "Right, 'thirteen.' Only forty-nine to go."

"No, I mean, thirteen is the number I want."

"What?"

"I want fifty tickets made out to the number thirteen. I can do that, can't I?"

Johann nodded vigorously. "Yes. Sure you can, and think of the money if you win. Seven hundred dollars fifty times, that's. . ."

"Thirty-five thousand dollars," Elisabetha supplied.

"Yeah, thirty-five thousand dollars." Johann quickly wrote out the tickets and passed them and fifty dollars in one, five and ten dollar notes. "Don't spend it all in one place."

***Tuesday morning March 16, 1634,
Karickhoff's Gym, Magdeburg***

Wilhelm Koch walked into Tommy Karickhoff's office. Tommy sat behind a massive desk, leaning back in his chair. "Herr Karickhoff, I have the results from Monday's lottery. The winning number was zero-one-three. . ."

"Hey, I like it. Not many people like the leading zeros. How did we do?"

Wilhelm buried his face behind his papers. "Sales for Monday were eighteen thousand six hundred and twenty-three tickets. Our gross income was eighteen thousand six hundred and twenty-three dollars. Less

commissions that is seventeen thousand six hundred and ninety-one dollars and eighty-five cents."

"Wilhelm, just cut to the chase. How many tickets won and how much profit did we make."

The papers rustled in Wilhelm's nervous hands. He poked his head over the top of them. "Normally we would expect between fifteen and twenty winners on sales of that size . . ."

"Come on Wilhelm. We don't have all day. How many winning tickets were there? From the way you're carrying on I assume there were more than expected."

Wilhelm nodded.

"Well? How many?"

"Fifty-six," Wilhelm whispered.

"Speak up. That sounded like you said fifty-six."

"I did, Herr Karickhoff. There were fifty-six winning tickets on Monday's draw."

Tommy shot to his feet. "*What?* Fifty-six? On a leading zero? We haven't been selling more than ten tickets per number on any number with a leading zero for months. Who the hell sold those tickets?"

Wilhelm checked his notes. "Anna Dieckmann sold two, Philipp Schneider one, and Otto Wolforath three. Johann Roeloffse sold fifty."

"Fifty? One person sold fifty tickets on the winning number. Something smells." Tommy slammed his fists onto his desk. "I want you to take Conrad and Georg with you and invite Johann Roeloffse to visit me before noon. Understood?" Wilhelm nodded nervously. "Well get a move on."

* * *

The day started just like any day for Johann Roeloffse. He sat at his favorite café and opened his newspaper. He read the comics first -- chucking quietly at the antics of Brillo -- then the sports page. Finally he turned to the financial reports for the previous day's trading. He looked at the three trading figures Tommy Karickhoff used for his numbers lottery, and wrote down the last dollar digit from each. By the time he'd recorded the third number he knew today was going to be bad. He put down the paper and looked around. Already he was starting to sweat.



And there they were. There was no way a person could fail to recognize Tommy Karickhoff's men. The black American-style pinstripe suits with the tip of a white handkerchief poking out of the left breast pocket and a white carnation pinned to the lapel, the black hat with the white band, the black shirt with a white tie, the black and white lace up shoes, and finally, the small instrument cases they carried, made them instantly recognizable. He'd never met anybody who'd actually seen what was carried in the instrument cases, and he didn't want to be the first of his contemporaries to find out. He looked behind him, looking for a line of escape, but it was no good running.

Wilhelm stepped up to Johann's table. "Herr Roeloffse, please follow me, Herr Karickhoff wishes to talk to you."

Johann stood and followed. Resistance was futile. He'd once seen a couple of bully boys after they'd foolishly attacked one of Herr Karickhoff's men. It hadn't been pretty. "Is Herr Karickhoff angry?"

Georg Wachter smiled grimly. "What do you think?"

Johann swallowed.

Karickhoff's Gym

Tommy was building up a useful sweat on the punch bag, alternating periods of punching with periods of kicking. He kept working the punch bag for another five minutes after Conrad and Georg escorted Johann into the room. Finally the timer went off and he stopped.

He grabbed a towel and mopped up the sweat pouring down his face. "This the guy?"

Conrad nodded.

Tommy turned his attention to Johan Roeloffse. "What do you have to say for yourself?"

"I didn't expect the tickets to win. Everyone knows that numbers less than a hundred don't come up very often."

Tommy held back a grin. *Only ten percent of the time.* "So you sold fifty tickets on the number thirteen. Who did you sell them to?"

"You can't blame Elisabetha. I pushed her into buying so many tickets."

"Elisabetha? Are you saying one person bought fifty tickets on one number?"

"Yes. She tried to buy just one ticket with a one hundred dollar note. I didn't have change so she took pity on me."

"And where did this Elisabetha get a one hundred dollar note?"

"She found it." Johann must have seen the look on Tommy's face. "Truly, Herr Karickhoff, Elisabetha is a good girl."

"Sure she is. Well, it seems your 'good girl' has bought tickets worth thirty-five thousand dollars. Do you know where she works?"

"She works the night shift at the laundry, Herr Karickhoff."

"Right. Lead Conrad and Georg to her and then you can get back to selling numbers. And don't plan any trips out of town for a while. Understood?"

"Yes, Herr Karickhoff," Johann answered.

* * *

Her landlady looked grim. Elisabetha wondered what she'd done to so upset Frau Knoche. She really couldn't afford to lose this room. Affordable rooms were in short supply in boom town Magdeburg.

"There are a couple of men who want to talk to you," Thrina Knoche said.

Elisabetha looked around Frau Knoche. She saw the suits. "Oh."

Conrad pushed forward. "You are Elisabetha Schmelzer?"

Elisabetha nodded.

"Right. Georg, escort Frau Knoche back to her room."

"Now just a minute. This is a respectable house. I'll not have strange men in one of my girl's room," Thrina protested.

Georg reached out a hand. Applying pressure to a point on her shoulder he escorted the suddenly silent Frau Knoche out of Elisabetha's room.

"Sorry about that." Conrad smiled. "But I don't think you want people knowing your business. On Monday you bought some numbers from Johann Roeloffse. Correct?"

"Yes."

"Do you have your tickets?"

"Yes. But what is this about?"

"Have you seen today's paper yet?"

"No."

Conrad opened his instrument case and extracted Johann's paper. He opened it to the financial page and passed it over.

It took a few minutes for it to sink in. Then Elisabetha dived for the purse under her pillow. She pulled out the bundle of tickets and checked the numbers. "I won?"

"Yes, you won. The boss would like to talk to you."

Elisabetha held the tickets protectively to her breast. "Why? I haven't done anything wrong."

"Why don't you come along with me and Georg and find out?"

"I've really won? I've really won thirty-five thousand dollars?"

"Yes, you've really won. Don't shout it from the rooftops. The fewer people who know, the safer you'll be."

Karickhoff's Gym

Tommy liked what he saw when Elisabetha walked into his office. She wasn't what most people would call beautiful, but she came close to his ideal with those enormous green eyes and shaky smile. "Take a seat, Fraülein Schmelzer. Has Conrad told you why I wanted to see you?"

"He said I won Monday's lottery," Elisabetha answered.

"Yes. You won thirty-five thousand dollars." Tommy stood up and approached her, knowing it would make her uncomfortable. "That's a hell of a lot of money to win on a single draw. It makes me suspicious. To bet fifty dollars on a single number makes me even more suspicious. It makes me wonder, is someone trying to pull a con. "

Tommy leaned forward until his eyes were less than a foot from Elisabetha's. More intimidation couldn't hurt. "You wouldn't be trying to steal from me, now, would you?"

Elisabetha swallowed. "No."

"So explain to me why you bet fifty dollars on 'thirteen.'" Tommy stood back, his eyes still watching Elisabetha. She told him the same story Johann had.

"What alleyway?"

"Just off Sommersburg Street up the road from Venice Avenue."

"I know it. Medium rent area of the red-light district," Conrad said.

Tommy nodded. One hundred dollars wouldn't be an unusual fee in that area. "You sure you didn't earn it yourself?"

Elisabetha shot to her feet. "I don't have to take this. I want to leave. Give me my money."

Tommy nodded to Conrad and Gerog who pushed Elisabetha back into her seat. "I'm not passing judgment. I don't care how you earned the money. I just want the truth. I find it hard to believe anybody would lose a hundred dollars and not try to find it."

"It was sunrise when I found it. Maybe they couldn't see it in the dark? If a kitten hadn't been playing with it, I wouldn't have noticed it myself."

"A cat? How did I know there had to be a cat in this somewhere? Right. We're going for a little walk. I want to see this famous alley."

* * *

"This is it." Elisabetha pointed towards the narrow space between the buildings. "Over there is where I hid."

The door was recessed far enough that Elisabetha could have been hidden. It certainly looked like she was on the up and up.

There was a gentle rustle in the accumulated rubbish over by the wall. Tommy concentrated on the shadows. Then he launched himself at the small shape.

"Ouch! Shit, that hurts."

"Do you need help, Tommy?" Conrad called out.

"No. I think I just captured Elisabetha's accomplice."

Tommy emerged from the alleyway with his thumb in his mouth and a kitten held securely against his jacket. He looked over at Elisabetha. "Do you know this animal?"

"It's the kitten I saw. What are you going to do with him?"

Tommy examined his bleeding hand. "Right now, I'm inclined to break the little devil's neck."

"No! You mustn't. He's someone's pet," Elisabetha said.

"I doubt it. The guy's all skin and bones."

"Well, then, I'll take him."

Tommy handed the kitten over. "It seems I owe you thirty-five thousand dollars. Now, I could give you the money in cash, but that's a lot of cash. Will you accept a check? Do you have a bank account?"

"Yes I have a bank account. Could I have a bank check?"

Tommy grinned. "I like the way you think. How about we both go to the bank and we can draw the money out of my account and put it straight into yours?"

"That will be satisfactory, thank you."

* * *

Tommy examined the scratches on his hands. It seemed Elisabetha's story stacked up, which left him worrying about the rest of her story. He didn't like the idea that someone had followed her when she left work. He'd tried to talk her into quitting. With her winnings she could afford to look for a better job. But no, the stubborn girl insisted she'd stay working at the laundry. He had been able to convince her to transfer to the dayshift, but she had insisted that she would finish off the week so as not to inconvenience her employer. Tommy didn't like to think of her walking the streets alone at night. He rang the bell on his desk.

Wilhelm poked his head round the door. "You rang?"

"Yeah, I rang. See if Heinrich has finished with Conrad and Georg. If he has, ask him if he can spare me a few minutes."

"Immediately, Herr Karickhoff."

Tommy checked the time and sat back in his chair to wait for Heinrich to turn up. The master class he was taking normally finished at half-past, but sometimes Heinrich ran overtime.

* * *

The quarter hour had just sounded when someone knocked on Tommy's door. "Send him in, Wilhelm."

The door opened to admit Heinrich, Conrad, and Georg. At the door, Wilhelm tried to make himself as small as possible. "I am sorry, Herr Karickhoff, but they insisted on accompanying Herr Kreffting."

"That's okay, Wilhelm. Just see that we aren't disturbed." Then Tommy looked at his men. "Stop trying to terrorize Wilhelm, you two."

"Yes, Herr Karickhoff," they chorused.

Tommy glared at them. Their grins were unrepentant.

"You wanted to talk to me?" Heinrich asked.

"Yeah, I'd like you to ask Susanna to strike up a friendship with a young woman."

"'A young woman,' he says. What he means, Heinrich, is that he has found a girl he is interested in, and she might need some protection," Conrad said.

"Though I don't know what he sees in her. There's not a lot of meat on her bones. He needs a real woman," Georg said.

"I don't happen to agree with your idea of a real woman, Georg." Tommy looked back to Heinrich. "She thinks she was followed home from the nightshift at the laundry. Whoever it was had her sufficiently rattled to duck into an alleyway in the red light district to hide. I don't want her walking to and from work alone."



"You want Susanna to find a job on the same shift as your lady friend and to strike up a friendship?" Heinrich asked.

"Something like that. If Susanna is willing, I can talk to the owners about giving her a temporary job there."

"Tommy, Susanna doesn't like doing laundry."

Tommy grinned. "It's only for the rest of this week. Elisabetha will be transferring to the day shift next week. I'll make it worth Susanna's while."

"Susanna wishes to get Anna and Andries into the Duchess Elisabeth Sofie school."

Tommy whistled. "She doesn't want much. Anna shouldn't be a problem, but Andries? It's supposed to be a school for girls."

"With boys admitted to selected classes. Susanna would be satisfied with that."

Tommy sighed. "I'll have a word with Staci, but I need Susanna to start tonight."

"I'm sure Susanna will trust your ability to convince Fraülein Matowski, Tommy."

"Thanks, Heinrich. Conrad, would you go along to point Elisabetha out to Susanna?"

"Sure thing, Boss."

Saturday morning, March 18, 1634

"Thank you for walking home with me."

Susanna rolled the magazine she had been reading during work breaks and grasped it lightly. "No need for thanks, Elisabetha. Two women together are safer than one."

"Who are you going to walk home with next week? Tonight was my last night on the night shift."

Susanna shrugged. "Don't worry about next week until it arrives. Something will come up."

* * *

They both heard the footsteps. They stopped when the women stopped and started when they resumed walking. Susanna leaned close to Elisabetha. "When we get around the next corner I want you to run for the alley."

"But there are at least two of them," Elisabetha protested. "And you don't have a weapon . . ." It suddenly dawned on her that the magazine Susanna carried was being held as if it was a weapon. She met Susanna's eyes and saw the martial gleam in them. She swallowed and looked ahead. Her new friend obviously felt quite capable of taking care of herself.



Once around the corner Elisabetha took off as instructed. When she reached the sanctuary of the alley, she looked back. Susanna had her shawl in one hand and her tightly-rolled magazine in the other. When two men ran round the corner she struck. She cast the shawl like a net to entangle one man while she thrust the rolled up magazine hard into the gut of the other. Then she kicked out at the man struggling with her shawl.

Almost before it started, it was over. Two men lay moaning on the ground while Susana stared down at them, daring them to move.

"Come on, Susanna, leave them before someone sees."

Susanna shook her head. "First let's get some names." She quickly rifled the men's clothing looking for documentation. Once she had the contents of each man's pouch in hand Susanna threw her shawl back over her shoulders and walked off.

Elisabetha rushed to catch up. "Where did you learn to fight like that? I've never seen the like."

"My father is a *maître des armes* and runs a *salle des armes* in Bremen, and my husband also comes from a long line of masters of what the up-timers call 'martial arts.' What my family didn't teach me, he did."

Elisabetha turned to look at the two men who were now staggering to their feet. "Could you teach me to fight like that?"

"Of course. I give classes at Herr Karickhoff's gym."

"What? Susanna, if you're teaching martial arts, why are you working the night shift at the laundry?"

Susanna smiled. "Herr Karickhoff asked me to look after you."

Elisabetha blushed. It'd been a long time since anybody had looked after her. "Why did you want names?"

"So Herr Karickhoff could determine their motivation. Maybe they were just following a couple of women for a little fun and games. Maybe they have heard that you won so much money and hope to force you to tell where you have hidden it." Susanna shrugged. "Who knows? Herr Karickhoff will find out."

"I want to be there when you give those papers to Herr Karickhoff."

Susanna shook her head. "No you don't. It'll take time for Herr Karickhoff to make inquiries. In the meantime, you've just finished work, you're tired and hungry, and . . ." She looked Elisabetha up and down. ". . . not looking your best. That's no condition to be in when you confront a

man. Go home, eat, have a few hours sleep, and you can confront Herr Karickhoff looking your best."

Karickhoff's Gym

Elisabetha looked at Tommy in disbelief. "You publicized the fact that I won all that money?"

"It was a perfectly logical business decision, Elisabetha. We didn't release your name; just that someone had won thirty-five thousand dollars on the lottery. Sales have been up nearly fifteen percent."

"I might have been robbed or worse and all you can think of are your lousy sales?"

"Hey, a fifteen percent increase is nothing to sneeze at. Besides, you were in good hands. You had Susanna looking after you."

Elisabetha glared. "If you didn't release my name how did those two men discover I had won the money?"

Tommy gave a wry grin. "Blame your friend Roeloffse. He let it out that he sold the winning tickets. Someone must have noticed Conrad and Georg talking to you."

"Someone must have noticed your two men talking to me!" Elisabetha shouted. "How could anybody miss noticing the uniform you have them wear?"

"Don't blame me. It was their choice. Mind you, I think it's pretty snazzy myself."

"Herr Karickhoff . . ."

"You can call me Tommy. It's a privilege reserved for those I let yell at me."

Elisabetha looked around the room. Susanna lounged on a double chair with her husband. Conrad was sitting back in a chair watching with interest, while Georg idly cleaned his fingernails with a knife. She started thinking. "Frau Knoche?"

Tommy nodded. "Probably. I think you need to leave her boarding house."

"But where will I live?"

"You can have one of the spare rooms here at the gym until you get settled."

"I insist on paying rent," Elisabetha said.

"Sure, just as long as you move out of that rooming house as soon as possible. Conrad and Georg will help you."

* * *

Susanna grinned. "I bet I know where you'd like to see Elisabetha settled, and it isn't in one of the spare rooms."

Tommy stared at the door Elisabetha had left through and smiled. "I don't bet against a sure thing."

* * *

Hunting Traditions

Written by Garrett W. Vance



Walt Dormman looked up at the cold blue skies of an early October morning and knew that it was time to go hunting. He went to his small but well loved gun collection and held them one by one, as if greeting old friends. He had grown up hunting; it was a tradition in his family as it had been for most West Virginians; the roads from Grantville now leading to Rudostaldt and Saalfeld instead of Fairmont and Monongah didn't change that. Walt pondered the forests of the Thuringerwald, could they bring him the pleasure that the West Virginia mountain country had supplied in such bounty? Walt aimed to find out. One by one he approached his old hunting pals, trying to get a group together as they had done so many times before the Ring of Fire. One by one his friends apologized, they'd love to come but they were just too busy with all the new responsibilities and challenges the seventeenth century had thrust upon them, even for a weekend hunting trip. Walt came home and slumped glumly in his favorite chair. His wife Crystal found him there staring at the black TV screen.

"What are you doing, honey?" she asked cautiously. They were still newlyweds and their love was good but she had learned that Walt occasionally had gloomy moods and that it was best to lead him out of them gently. Walt was having a more difficult time adjusting to their new century than she was and there wasn't anything in the self help and positive thinking books she had collected about dealing with time travel.

"I'm pretending to watch a football game."

Crystal laughed, laying her hands softly on his shoulders. "Who's winning?"

"The WVU Mountaineers of course."

"Who are they playing?"

"The Dallas Cowboys."

"But that's a *pro* team!"

"Hey, this is *my* fantasy. If you don't like it make up your own TV show."

"Okay, okay!" She began rubbing his shoulders gently. "Walt, is something bothering you?"

Walt slumped back, blowing out a sighing breath of air. "Yeah, I tried to get the guys to go hunting but nobody can make it. Everybody's busy trying to build an empire I guess. Me, I just want to do some hunting and get out of town for a couple days."

Crystal kneaded her understanding into Walt's taut shoulders. "I understand how you feel, honey. Could I go with you?"

Walt chuckled grimly. "Crystal, you couldn't flush a dead goldfish down the toilet without tears. You do *not* want to go hunting, trust me. I'm just going to go ahead and go alone; it won't be the first time."

Crystal's massage stopped. "Alone? I don't think that's a very good idea Walt."

"Why not? I used to go out alone all the time, even when I was just a kid."

"Yes, but that was up-time West Virginia, not down-time Thuringia. Things aren't the same here . . . they're more dangerous."

"Oh come on, what's dangerous about it?"

"Well, remember those bandits that attacked your mom and Mister Gerbald up by the lake?"

"Crystal, that was a couple years ago. The police have got things under control now."

"You can't tell me the Grantville cops have got an officer patrolling every wooded hillside in the region. At work I'm out on the roads and I see maybe one cop a day once you leave the Ring and there are some unfriendly looking dudes out and about. I stay in the grader most of the time."

Walt rubbed his temples in an attempt to coax out some patience. "Okay, sure, there are some bad guys in the world. But look at it this way: I'll be a lot better armed. Crystal, I'm going nuts here! I need to do something familiar, something so I can just feel normal again. I love hunting and I know what I'm doing; please don't give me a hard time. Besides, it wouldn't hurt any to have some fresh meat on the table."

Crystal gave him a long worried look and then smiled weakly. "All right darlin'. It's just 'cause I love you. Thinking of you out there alone in the woods at night just kind of scares me."

"I know, but really, I'll be fine. It's totally safe."

The next day Walt bustled about preparing his gear. His pack and tent were a bit musty so he laid them out in the front yard to air them in the sun. It was getting cold at night but the afternoons were still fairly balmy; perfect hunting weather in Walt's estimation. He studied the tent for a few minutes, he had only used it a couple of times back home where he could put the canopy on his old Chevy truck and park it at the end of some back road, an easy walk to the hunting grounds. Here in the sixteen hundreds his truck had been sold to the road department because gas was so expensive (which still irked him) and was no longer his at all. He'd just have to hike and use the tent and reasoned that the joy of hunting would be worth the extra trouble.

Around four o'clock Crystal said goodbye cheerfully as she left to go visit his mother, Pam. This was her own business; Walt still wasn't very comfortable with their chumminess, even though their friendship had started before Crystal even knew Pam was his mom. Thanks to Crystal's gentle pressure he at least talked to his mother these days, albeit for very brief periods of time and relations were still strained. He didn't say much to Crystal on the subject since Crystal had lost everyone to the Ring of Fire, except her aunt who lived in town, and Walt knew she was kind of desperate to build a new family. If she could find common ground with his mom where he never could, well, he supposed he was happy for both of them. A few hours later she came home wearing an expression of being most pleased with herself. Walt thought about asking her what was up but then decided that sometimes it was better not to know and went back to fussing with his gear.

Just after dinner a knock came at the door. Walt opened it to find a man wearing a sage green long coat, a misshapen mustard yellow hat and a shortsword belted to his hip. It took him a moment to realize this was Gerbald, his mother's hired man, or more accurately, bodyguard. In any case it was about the last person (other than his mother) who he expected to see at his front door. Even more surprisingly the man was smiling affably; the last time Walt had seen the ex-soldier he had worn a stony scowl that seemed permanent.

"Hello Walt. I am Gerbald."

"Yes, hello, Gerbald. I remember you. Uh, what can I do for you?" Before Gerbald could answer, Crystal's voice came from the kitchen.

"Walt? Who is it?"

"It's my mom's . . . friend, Gerbald, honey," he called back

"Oh, good! Don't just stand there, invite him in!" The woman was able to see through walls, one of many such super powers that Walt, after three months of marriage, was still discovering. He turned to the still patiently smiling visitor at his door.

"Sorry! Come in Gerbald. Can I get you a drink?"

"Beer, if you don't mind." This was something nearly all Grantville men, up-time or down, agreed on. It had taken some time to get used to the stronger flavors but the up-timers had now pretty much unanimously come to the conclusion that the local stuff was a damn sight better than that watery stuff in cans they used to get.

"Sure. Have a seat, I'll be right back." Before he could take one step toward their small kitchen Crystal appeared, carrying a tray with two tall glasses of golden *Weissbeer*.

"Hi, Gerbald! Thanks for stopping by!" Crystal favored Gerbald with her best smile, the one that could stop traffic; it came in handy in her job with the road crew.

"The pleasure is mine, Crystal." Gerbald sat carefully on a stool, to accommodate the sheathed sword that was his perpetual companion, the picture of a contented guest. He raised his glass to Walt, who still stood awkwardly in the middle of the room.

"To your health. It is so nice to see such happy young people." Apparently Crystal appeared happy enough for two. He drained his glass more than half way with the first swallow.

"Uh, thanks. Cheers." Walt joined his wife on the loveseat, where she sat beaming rays of sunshine from her freckled face.

"So, honey, why is Gerbald here?" he asked nonchalantly.

Crystal's penny bright eyes shone with satisfaction. "Well, you're going hunting next week and none of your usual crowd can make it and so I thought it would be nice for you to have someone to go with! I was talking to Pam and she told me that Mr. Gerbald here is a very experienced woodsman."

Walt stared at her. "So you invited him to go with me?"

"Yes! You two can go together! Gerbald knows his way around the Thuringerwald and he's an expert tracker, but he doesn't have a hunting rifle. So, he would trade his skills for a share of the meat, plus share any game birds he snares with us. If you guys joined forces it would be a lot safer, and you'd have a better hunt!"

Walt frowned. Gerbald smiled, contentedly making the rest of his beer disappear.

"Crystal, like I told you yesterday, I've gone hunting alone many times, since I was just fifteen! I know how to track a buck. Besides, I know what you're really up to. You're afraid of me going out alone so you're borrowing my mom's bodyguard."

Crystal rolled her eyes, and then narrowed them. "What if I am? Ya know, back in West Virginia there weren't people with swords and a general lack of guilt about killing other people roaming the countryside, either. Sure, things are better since we got here, but there are still wars going on all around us, as you should know mister army reservist, and a guy out alone is an easy target for bandits, deserters, the black knight, whatever. Gerbald was a soldier, he knows what's going on and he knows these woods like the back of his hand—pretty basically the best possible guy to go hunting with in these times, *comprende*, Bucko?" Her arms were crossed, which was a bad sign; reasoning would be futile.

Walt looked to Gerbald. "Gerbald, help me out here. I've been hunting since I was a kid, I don't need a baby sitter. In your opinion is there any real danger in hunting the Thuringerwald?"

Gerbald looked thoughtful. "Well, I am sure you are an able woodsman Walt, most Grantvillers are. You have faced dangers in the woods and handled them, I have no doubt. But, even though your excellent police have driven the worst sorts from our roads and towns, there is still the possibility that such men are about and the woods are still a good place to hide. In any case, bandits or not, I would be glad to have your gun at my side; I'm afraid all I have are a couple of pistols of the kind we had before Grantville appeared and I'm sure you are aware of their shortcomings. Your up-time weapons are much better."

Walt swallowed those salves to his wounded pride. He had seen the pistols of the day and they were like something out of an old pirate movie. Not seeing an easy way out he decided he might as well go along with it. Gerbald seemed like a pretty decent sort for an older guy and his English was nearly as good as a Grantvillers, he had even developed a hillbilly twang in his accent. It would be kind of like going out with his dad's old chums like he had done when he was a little kid. Also, Walt very strongly wanted to show his bewitching new bride that he could put food on the table with his own hands and he reckoned it would be useful having a guide who knew the territory. He looked to Gerbald again.

"Well, let's do it then. It's early October now, when do you think we should go?"

"How about this weekend? My schedule is flexible. I know an excellent place as well, a wilderness under the control of an old friend, a most excellent hunting ground."

Walt nodded while Crystal's face filled with obvious relief.

"Oh, thanks for agreeing, Walt. I'll feel a lot better knowing you aren't out there alone." Crystal's mission was accomplished. "Here, let me get you guys some more beer."

* * *

After Gerbald's departure Walt sighed and shook his head. "So, I get to go hunting with Rutger Hauer as Daniel Boone. That's just *wunderbar*."

"Walt honey, I'm going to sleep a lot better knowing you aren't alone out there. I'm a little old city girl, remember? I'm a'scared of the big bad woods!"

"Yeah, right, Farmington was a huge metropolis. And from what I've seen so far you ain't scared of nothin'."

Crystal smiled, a beatific expression gracing her face. "Maybe so, but I can be scared for people I care about. Now come here my mountain man, we got some cuddling to do."

* * *

Friday afternoon Gerbald came up the road with only a simple leather bag strapped over his shoulder. Walt was out in the yard with Crystal who was trying to help him and pretty much only getting in the way. He was now regretting agreeing to this team-up and was just wishing to be left alone.

"*Waidmann's Heil!*" Gerbald called out cheerfully. "That is the traditional hunter's greeting."

"Well, howdy do. Ya know, West Virginians have a traditional hunter's greeting as well: *Hey dude, let's kill some shit!*" Walt answered back in a slightly mocking tone.

Gerbald looked at him with a keen eye. "Ah, so I see, of course you have your traditions as well. Very well then, *let'skill some shit, dude.*"

Although Gerbald was smiling broadly, hearing the older man repeat his sarcastic words made Walt feel rather small. Crystal saw his discomfiture and joined Gerbald in gazing on him with the patience of the wise and ancient.

"Walt, we must be respectful of traditions," she whispered at him chidingly. Walt scowled at her, his face growing hot. She was only two years older than he was and could hardly be counted in the ranks of the traditional.

"Well let's get going then." Walt turned and started marching down the drive. Crystal caught his arm and swung her arms into an embrace around his neck.

"Not without a hug, bucko." As Crystal jumped on him Walt looked around to see that Gerbald had managed to wander over to the garden's edge and become very interested in the stone border's construction. Walt hugged her back.

"I 'm sorry I've been so moody lately, Crystal. I'm still getting used to how things are here in this time, I can't help it. I never thought I'd be living in a world like this. Having to go hunting with our local representative of The Merry Men for a guide is just kind of hard to swallow."

"I know, Walt. We all feel that way sometimes, but this is *our* world now, this is where we're going to grow old and raise our kids. I want you around for all that."

"Kids? Jeez, Crystal, don't even say that word yet! We just got hitched a few months ago."

"That's plenty of time! Well, don't you fuss about our future joy right now, sweetness. Just go out in the woods and shoot some shit for me and have some man fun. I'll be here waiting . . . in those cut-offs you like so much." Walt felt his head starting to spin, *raise our kids* and *those cut-offs* held hands and danced dizzily in a circle around him singing *tra-la-la*. He kissed her quickly and disengaged himself- the Thuringerwald now beckoned as a refuge for all free men of the land, and those who used to be.

"Hey, Gerbald, let's go! Bye, honey!"

"Have fun, fellas." Walt glanced back to see her still standing in the yard with a serene smile. He waved and hurried his pace.

Raise our kids . . . US!?

* * *

Walt was still wrestling mentally with the concept of his not so blushing bride growing large around the middle and a future of diaper changes and late night bottles. For God's sake, someone had better reinvent disposable diapers before that happy event! They left the smooth but slowly cracking roads of Grantville for the more primitive surface across the Ring of Fire's rim. Crystal had most likely graded this stretch from a rutted wagon track to something resembling a modern road herself. A sense of pride in his hard working and very damn pretty wife swelled up in him; yes, he had done exceptionally well. If becoming a father was inevitable he at least knew he had made the right choice for a partner in that difficult venture. His own folks

had divorced as soon as they thought he was old enough to take it and Walt had long ago solemnly vowed not to be like them. His love for Crystal was fierce, what she gave back was the same and sometimes the intensity of it nearly scared him. Walt decided to give his mind a break and tried to concentrate on the scenery instead.

They passed fields and farms. He saw a clanky up-time tractor working the same field as a team of oxen. Later they passed by an advertisement for "*The Best Cheeseburgers in Thuringia*" painted bright red in modern block letters in both English and German on the side of a barn that looked to have been erected in the Iron Age. These were evidence of the spread of America into their new time and country. It occurred to Walt that some of his usual resentment at missing out on the comforts of the 1990's had been replaced by a fascination with the new nation they were building here. If—no, better make that *when*—he did become a father this would be the world his children would live in. Looking at the pure blue skies and amber fields of a German fall he thought that maybe it wouldn't be so bad. At least they would have cheeseburgers.

They walked a long time through the pastoral storybook countryside, the leaves all the cheerful red and gold of autumn; then walked a long time again. Walt was now too tired to mull over his future complications or enjoy the scenery and simply concentrated on putting one foot in front of the other. After a short rest near a muddy field in which Gerbald visited some bushes they continued to walk a long time again. The straps of Walt's pack, heavy with his hunting rifle and ammo, began to chafe his shoulders even through the thick material of his baseball jacket. His feet were beginning to hurt in his light hiking boots. He had born this long walking in stoic silence but enough was enough. Finally he asked: "Are we there yet?"

"Nope." Gerbald's tone was irritatingly contented.

"That's what I figured you'd say . . ."

After a further extended period of sore-footed ambulation the afternoon was growing late indeed. At last Gerbald came to a pause; he and Walt stood at the edge of towering pine woods sweeping up into brooding hills. Unsurprisingly the forest was dark, damp and inhospitable looking beneath the needled canopy.

"So, is this where Hansel and Gretel got lost?" Walt asked while regarding the intensely primeval quality of their destination with a doubtful expression.

Gerbald chuckled, the sound nearly swallowed by the enormity of the hushed woodland. "No my friend, that is a few miles west. This is the wood where Little Red Riding Hood met the wolf!" Gerbald laughed merrily at the jest, not making Walt feel in the least bit better.

* * *

They hiked up through corridors of giant grey-barked trunks, some well over five feet in diameter. The constant shade kept the undergrowth low but the footing was tricky due to loose rocks hidden by a carpet of rusted pine needles and Walt suffered more than a few scrapes from low branches and brambles as the visibility dimmed. At times they had to skirt around rocky outcroppings and lichen painted cliffs. Finally, at a somewhat level and open flat area on the wooded mountainside Gerbald declared that it was time to make their camp. Walt was too tired to cheer. Gerbald collected some rocks and constructed a simple fire circle under the cover of a six foot deep depression in an exposed granite wall; not quite a cave but enough room for them and the fire to stay mostly out of the rain if it came. Walt looked on, exhausted but knowing that he had better set up his tent before darkness fell. He made himself get up and scout for a good spot.

Walt soon found a lovely patch of small gravelly stones in a narrow bed. It was by no means flat but wasn't at too steep a pitch, either; just right for his one man tent. It was a camouflage lightweight hunter's model, a classic pup tent with a rain-fly. Walt lay down a plastic ground tarp, spread the tent down on it and then pounded the stakes into the gravelly ground with the back of his camping hatchet. He had quite a struggle erecting the ungainly structure but eventually the tent was up. Walt inflated his heavy duty air mattress with a small foot pump. He unrolled his foul weather sleeping bag and, sitting comfortably on it, took his waterproof gun and ammo bag out of his backpack.

He had brought along only two weapons since he knew there'd be a lot of hiking involved on this trip—no more driving his truck out to the hunting grounds, and guns and ammo were *heavy*. On his belt he wore the Smith & Wesson .357 Magnum revolver that he had inherited from his granddad, a Viet Nam vet who had passed away before the Ring of Fire. Since joining the army reserves after the horror of the Croat raid on the high school he rarely took the thing off, figuring it was better to *be prepared*. Facing those medieval fuckers and their swords with just a baseball bat had removed any inhibitions he might once have had about going about his daily business armed.

After some debate he had chosen one of his favorites for the hunt; a 1963 Winchester Model 94 chambered in 30-30 he had found in a pawn shop in nearly perfect condition. It had been a real steal, and was considered by his dad's grizzled old hunting buddies to be a better rifle than the ones produced in later years. He had been tempted to get a scope for it but the older guys had laughed him out of it, scopes were for overeager kids who wanted fancy toys and wouldn't do him much good in West Virginia's narrow valleys anyway. Besides, Walt was gifted with keen eyesight. This rifle had been his companion on a number of successful hunts in the comfortable old woody hills back up-time; it should serve him well in these still foreign-feeling forests. The current circumstances made him treasure his guns all the more. He carefully hung the bag by straps in the inside peak of his tent to keep it off the ground and out of his way.

Satisfied with his accomplishments Walt crawled out of the tent. He found Gerbald looking on dubiously.

"You will sleep in *that*?"

"Yes, that's what it's for."

Gerbald walked around it. He lifted the edge to peek under it.

"Do you mind if I look inside?" Gerbald asked, pointing to the entrance.

"Go ahead." Walt said, amused at the down-timer's first encounter with a modern tent. Apparently he knew how to use a zipper and soon half of him disappeared within.

"You will sleep on the ground?"

"No, I'll sleep on that air mattress. It will keep me off the ground and warm."

Gerbald extracted himself still looking dubious. He gazed at the darkening skies visible through the lacework of pine and spruce branches.

"Big rain tonight, Walt. Better not to sleep on the ground, even with a mattress." Gerbald indicated the flat area Walt had pitched his tent in. "You will surely get wet here."

Walt felt irritated by the older man's questioning of his camping skills. "No I won't get wet, this thing is waterproof. It's kept me dry in some real humdingers back in West Virginia proper. It's *you* who ya oughta' be worried about rain, I'm gonna be as dry as a Sunday school picnic."

"If you say so . . ." Gerbald replied in a less than convinced tone and with a shrug wandered off into the woods. Walt set about gathering more firewood and kindling, albeit in a lackadaisical fashion; he was about purely beat from the day's long, long walk.

After a while Gerbald returned with a huge arm load of conifer boughs. He looked around for a minute and then headed to a fairly large oval mound formed by a group of big ferns; a raised but very uneven surface. He proceeded to lay the boughs crisscrossed over the mound to form a natural mattress spring, the green branches smoothing out the gaps. He went back into the woods. Walt got the fire going with his Zippo and some dry wood shavings. Gerbald returned with another armload. Now the mound was a lot less bumpy looking, having come to resemble a giant bird's nest perched about two and a half feet off the ground.

Walt tried not to look too interested in Gerbald's project and nonchalantly whittled a stick with his Bowie knife by the crackling fire. Gerbald disappeared into the darkening woods again. Walt heard chopping sounds.

Gerbald came back with three fairly straight wood poles that he had cut the small branches off of, except for a forked branch at the end of one five feet in length, the other two were both eight feet. He produced a small but sharp looking pick from an inner coat pocket and made a six inch deep hole in the ground at what must be the top of his bed-nest. Into this he drove the bottom of the pole with the forked end, placing several good sized stones at its base to secure it further. Now he stuck the ends of the longer poles in the fork and secured them tightly with twine, their bottom ends placed to either side of the nest's foot. Gerbald had constructed a tripod lean-to. One more trip into the forest and the structure was soon covered completely in green boughs. Walt had to admit to himself that it was a pretty solid looking arrangement.

"Won't the rain get in there?" he asked.

Gerbald grinned, pleased with his work. "No, the rain will run off the branches away from me. I will be quite dry." Gerbald looked confident.

"If you say so . . ." Walt commented wryly, returning to his whittling. Gerbald just smiled.

* * *

They ate a quiet meal of fat juicy sausages roasted on sticks over the coals. Another good thing about Germany, the sausages sure beat the hell out of the crappy processed weenies back up-time. This was some good eating! Walt noticed even his seemingly indefatigable expert guide was looking a little ragged around the edges from the day's work. After the meal they both found themselves nodding off and soon said sleepy goodnights before heading to their respective shelters.

That night Walt found himself on the deck of a frigate in a surging sea, hurricane wind and rain slapping the sail's sheets in a black fury. Lightning flashed to reveal an enormous wave- before he could react he was washed over the side. Somehow he caught hold of a loose timber to ride, but it was unstable and threatened to spill him into the tumbling seas. Another wave swept over him and he clung to his makeshift raft desperately. Lightning flashed again, revealing still more massive waves barreling toward him and a glimpse of the ship sinking fast into the roiling sea. The next wave would surely be his end, a black wall of roaring sea rose over his head and . . . Walt woke up. Although the sinking ship and deadly seas had faded into the mists of dream, the wind and rain were real enough and, to his shock, dark water was still very much in evidence. With a gasp he realized his air mattress was actually floating! He tried to turn over and slipped from his float into nearly a foot of icy water, which rushed to fill his warm sleeping bag with biting swiftness. He managed to extract himself from its sopping weight to sit freezing his cotton-brief-clad ass off in the floodwaters. *What the hell was happening?* Walt was stunned and disoriented.

The increasing cold serving as a slap in the face, he found his wits again. With a rush of concern he checked his hanging guns; they were safe in the tent top, the water must be entering from below. Walt fumbled around to find the submerged flap zipper which he pulled up sharply. This opened the way for a new surge of ice cold water, which washed cruelly across his belly! He finally realized he had pitched his tent in a dry runoff: No longer dry! The heavy rains had transformed his perfect flat spot into a swiftly moving creek! Worse yet, since there was no place for the water to exit in the bottom of the tent it was filling up like a water balloon, now nearly to his seated chest. By a stroke of luck Walt's hand fell on his floating flashlight, mercifully it was a waterproof fisherman's job. Working as quickly as he could in the increasing chill Walt started to relocate his gear from the flooded tent over to the dryness of the campfire's rock shelter. First he brought out his pistol belt; thank God it had been hung up with the gun bag. He carefully placed it in a crevice that he hoped would keep it dry. Next came the waterproof gun bag, he placed this as far back in the hollow as he could away from the fire circle. Last came his backpack, its contents were completely soaked and heavy with water. He thought about trying to take the tent down but was afraid it would wash away from him so he left it where it was, a bloated water filled sack. Gerbald had tried to warn him. He felt like a total idiot.

Walt huddled shivering in his cold wet underwear under the leaning rock face trying to get the fire going again. After an interminable period of suffering he somehow managed to reignite the dampened coals by fanning them with his damp baseball cap and adding more dry wood shavings from the back of the almost-cave. At last he basked in the glow of a hearty fire but it was four in the morning and the marshmallow had not been invented yet. Walt tried to calm down and make the best of it as he wrung out his clothes and draped them over sticks planted beside the fire to dry in the flickering orange light and soothing heat. He sat staring numbly into the darkness waiting for the dawn to come, listening to the rushing of the heavy rain.

Eventually the downpour slowed and then stopped and Walt was left alone with the silence of the forest. He used this quiet hour to curse roundly the Ring of Fire and the benighted backward century it had brought him to, full of troubles and trials and responsibilities that he wouldn't have had to face until he were much older—if ever—back in the comfortable modern times he'd been stolen away from.

Gerbald woke just before sunrise, arriving at the fire dry as a bone and looking supremely rested. He saw Walt in his underwear huddling under a semi-dry coat, then looked at the drooping tent pitched in a run off and then looked back at Walt with a concerned expression.

"You can say *I told you so.*" Walt mumbled sullenly.

Gerbald spread his hands in a gesture of piety. "I must apologize for not being clearer. I thought your tent must truly be *waterproof*. I am very sorry."

Walt could see that the man was sincere and so decided to spare him his life. He returned to his dark thoughts as beams of golden light began to shine through the sopping wet forest.

"Want some coffee?" Gerbald asked very gently.

Walt nodded solemnly. "That would be good."

They drank it in a silence punctuated only by the irregular music of dripping water.

* * *

The morning sunshine proved to be a cure for the night's travails. They lingered there somewhat later than they might have waiting for Walt's possessions to dry. Around nine they broke camp. Walt wore the Winchester rifle on his shoulder, ready to take a shot if any thing presented itself. They left the rocky slopes behind as they climbed over the ridge to descend into a wide valley. Reaching its bottom they tramped through dew sparkled glens

and airy meadows. There were a lot of open spaces and Walt mentioned that it looked like good deer country. Gerbald concurred.



"We may find the *rothirsch* here. In English it might be called 'red deer'. A stag would be a fine thing to bring home to your lovely Crystal, let's see if

we can find one."

"Too bad we don't have any dogs with us," Walt said gloomily. His had died before the Ring of Fire and not been replaced.

"Yes, dogs would make lovely company," Gerbald agreed heartily. After a moment he added "Let us see what we can do with our own eyes and ears. Here, do you see this tree?" Gerbald pointed to what might be an oak along the meadow's edge. Walt walked over to examine it. The bark on the lowest branch had been chewed up—a good sign! Walt looked down to see a bare patch of ground which a buck had scraped away with its hooves.

"A buck has been marking his territory. He chewed on the branch here, leaving his saliva and musk on it, and scuffed up the ground."

Gerbald smiled and nodded. "Yes, indeed. I see that you have experience."

Gerbald ambled over to the tree, looking casually around. After a moment he began speaking softly. "This branch has been used more than once. The bark has grown back a few times here, and you can see older markings amongst the new. Do you see anything else?"

"Well, the grass is pretty thick here and I don't see any tracks leading away. Hard to say where he went from here."

"Take a look at the bare place."



Walt looked down. There were many tracks, laid one over the other. These red deer must be big critters; the hooves were nearly twice the size of a West Virginia whitetail. "These suckers are big," Walt remarked, impressed.

"I believe they resemble an American elk. They are quite large compared to your whitetail deer—which I understand have increased their numbers and spread quite widely out of Grantville, much to the dismay of certain vegetable farmers." They both laughed. "A mighty creature indeed, the *rothirsch*." He looked at the tracks "It seems the stag usually stands facing

this direction. I'll wager he travels this way often and always marks this place on his way. How old would you say these are, Walt?"

Walt examined the scraped area again. Some of the tracks were still sharply defined, the edges hadn't yet crumbled. "Hey, they're new! Fresh after the rain stopped this morning!"

"I agree. I think we should go in the direction of his tracks; it should bring us to the stag." Gerbald began walking. Shortly he stopped at an opening in the thick brush that formed a hedge along the tree line.

"We have found a path. Let's see where this takes us."

"How do we know he went in here?" Walt asked.

"We do not know for sure. However, game trails such as these are the highways of the forests. Many creatures use them; just like people they prefer the easiest route. They don't like to hit their heads on low branches or travel through thick brush anymore than we do. These paths always lead somewhere—perhaps to where our stag beds down."

They entered the forest and began following the winding path. With a bit of care it was easy going; the path of least resistance.

After a while Gerbald paused. Walt came up beside him to see deer droppings. Gerbald spoke quietly.

"These are fresh, Walt. We are following this stag most certainly."

Walt bent down to poke and prod at the droppings with a stick.

Gerbald grimaced. "Do you wish to see what it had for breakfast?"

"No, I'm just trying to see how fresh these are." A trace of annoyance crept into Walt's tone.

"I am sorry, Walt. Of course you are right to do so. I am a lazy enough fellow that if the shit looks moist and shiny as this does I am content to call it fresh." Chuckling, Gerbald continued on. Walt scowled at him behind his back. The spoor was indeed moist and shiny, and there was no doubt it had been left after the morning rain had stopped. Walt threw the soiled stick into the weeds and marched on.

The path led them into a narrow vale lined with bracken and brush. Walt realized that he had an eerie feeling he was being watched. It was beginning to bug him. Every time he turned around to scan the trees and thickets there was nothing to be seen but bark and leaves. He decided that it was just rattled nerves from his ruined night's sleep and tried to ignore it but the feeling was impossible to shake. At last he decided to mention it to Gerbald, even though he felt kind of silly.

"Uh, Gerbald? It's probably nothing but I feel like we're being watched." Gerbald nodded without looking at him.

"Yes, I feel it, too. Ever since we entered this valley."

Walt was surprised, and a little worried. Tales of cruel and desperate men lurking in the Thuringerwald were many and usually grisly; his wife had been collecting them for him all week. Certainly most were untrue or at best exaggerated, but still . . .

"Do you think it's . . . people?"

"I don't know yet, Walt. Let us continue our hunt as if we don't think anything is wrong. We will stay together and, how do you say? *Keep our eyes peeled*; a rather painful thought, makes me think of potatoes."

Walt didn't feel terribly comforted and forced himself not to look around again.

The game trail led them out into another region of open meadows striped by narrow copses of trees. They stayed near the cover as best they could, following the tree lines and watching for signs of big game. The feeling of being watched faded now that Walt had gone into his hunter mode; he now carried his rifle in his hands ready for quick action. It had become a matter of getting lucky and finding where their quarry had wandered to in this maze of grassland and trees; they both sensed they were getting close. Gerbald pointed at a ruffled spot in the tall amber grass.

"Look. I believe our stag has passed this way, the grass is bent down. Let's follow."

They stayed low. Moving as quietly as they could across the open meadow. Walt's pulse quickened, he was itching to bring down a nice buck; the thrill of the hunt sang an ancient song in him and all thoughts except locating his prey fell away. A tramping sound came from beyond a thicket of gorse. Gerbald paused and looked back at Walt, a wide grin splitting his face. He motioned silently for Walt to move ahead. Walt edged around the side of the thicket crouching low. Peering through the thorny branches he was rewarded with a wonderful sight.

About fifty yards distant stood the majestic form of the biggest buck he had ever seen rising above the grass, at least four feet tall at the shoulder. Its coat was long compared to a whitetail and a bit shaggy, making nearly a mane around its thick neck. Its fur was a rich reddish brown on the head and neck fading to an orange-ish gray on the sides and hindquarters; it was likely in the midst of its autumn color shift to a winter coat. Walt nearly gasped as he saw its mighty branching rack; much thicker than a whitetail's spiky

growth, almost like a moose's! As he slowly raised his rifle some part of Walt's ecstatic mind counted seventeen tines on the most impressive antlers he had ever beheld. It was a full-grown animal, a gorgeous thing to behold and as always Walt felt a slight tinge of regret as he positioned the rifle on his shoulder. His mother, despite their many rancorous disagreements, had managed to foster a deep respect, perhaps even love, of nature in him. He would end this magnificent beast's life today, but it would feed him and his wife in the coming winter and Walt would never, ever forget its grandeur. He sighted carefully, a clear shot, a perfect shot. He disengaged the safety, breathing out as he slowly put pressure on the trigger . . .

There was a crash of branches across the meadow and the buck bolted just as Walt fired. With an echoing crack the bullet hit the moving buck's upper hind leg. The animal's hindquarters were pushed sideways by the blow for a moment but it regained its balance and continued bounding away, slowed by its injury but still moving fast; a stream of crimson running down its graceful limb.

"FUCK!!!" Walt cried out. "I fucking grazed it! What the fuck spooked it?" Gerbald quickly scanned both the direction of the disturbance and the flight path of the wounded animal which headed into some trees at the meadow's edge. Walt wildly considered popping off a shot in the direction the noise that had scared his buck had come from but kept his temper under control. He then saw that for some completely mystifying reason Gerbald had drawn his shortsword and was using it to chop off a branch from their cover, then another, each about three feet long. He walked quickly to where the buck had been shot and began messing around with the sticks.

"What the hell are you doing?" Walt asked, greatly upset by the botched shot. It should have been the perfect kill! "Let's follow that deer, it's injured goddamn it!"

"Not your fault, Walt, I saw it all. I am not sure what startled the stag but we don't have time to go find out. Before we follow we must place the *anschussbruch* to mark the spot where the animal was hit." Using his pick to stab a hole in the ground Gerbald shoved one branch in so that it stood upright. "Now I must place the *fährtenbruch* to show which way the animal ran. It is a stag so the cut end is placed in the direction of flight, had it been a doe the branch tip would show the way." He laid the second branch on the ground from the base of the standing stick, pointing toward the spot the buck had disappeared into the trees.

"But Gerbald, *why*?" Walt felt frustration growing in him.

"These will help us track the deer, or others who may follow if we fail. It is a sign the hunter must leave, a message to other hunters. It is our tradition." Gerbald's voice was calm and full of conviction.

Walt regarded him as if he may be a lunatic for a moment but then the logic of the act sunk in. He took a deep breath, forcing himself to calm down. "Okay, I get it. Nice tradition. Now, can we get after that deer before we lose the poor thing?"

"Patience Walt, we shall not lose it."

Walt bit his tongue and followed in seething silence, quietly despising traditions, patient old farts and things that go crash in the bushes at the worst possible moments.

* * *

The trail was easy enough to follow, the profusely bleeding wound left a scarlet dotted line behind. Walt felt terrible; there was nothing worse than missing a shot and causing an animal to suffer. He silently cursed again at whatever had made that blasted racket and screwed up his shot, but didn't have time to dwell on it. Keeping pace with Gerbald in the brush required all his concentration and energy. After an hour of hard going they found their quarry slowly crossing a meadow in front of them, limping from its injury and breathing hard. They drew closer, reaching an angle for a clear shot. The buck looked at Walt but didn't increase its speed; its last power was spent. With a whispered apology Walt drew a steady bead on the wounded animal and ended its misery.

Gerbald walked over to the kill and took off his hat in respect. Next he took a sprig of spruce from a nearby tree and dipped in the blood from the killing shot. This he brought over to Walt who stood a few yards away feeling sad, tired and generally pissed off at the world. This was by far the greatest buck he had ever brought down and the joy was gone from it. He glared silently at the ground as Gerbald approached.

The older man spoke to him in a concerned voice. "Walt, I am sure I know how you feel. You must forgive yourself. As I said before, this was by no means your fault. Missing a kill and wounding an animal happens to all hunters at some time, you have done the right thing by ending what you started. It is an excellent stag and you must feel pride in your kill if only as a sign of respect to this great beast who will feed you this winter."

Gerbald reached out with his hand with the bloodied twig of spruce. "This is the *schützenbruch*, the shooter's branch. I would like to place this in your hat to honor you and your kill. It is our tradition."

A hot, irrational anger was rising in Walt, teeming with the many frustrations that filled him in this messed up time and place, spiked with irritation from a miserable night and the shame of a hunt gone badly. He growled at Gerbald. "Ya know what? I'm not interested in your weirdo traditions. Keep your bloody branch, I want no part of it." Walt turned and stalked off for the shelter of a nearby copse, already hating himself for losing his temper but too upset for reason. If he had looked back he would have seen nothing but understanding on Gerbald's face.

* * *

Walt sat on a log and thought for a while. He had been wrong to turn on Gerbald, the guy was just trying to be nice. It was probably partly because his quiet manner reminded him of the countless soft-spoken fatherly lectures he'd endured from his dad over the years, to the point where they pretty much wanted to make him scream. Walt wasn't allowed to just plain old get mad growing up; arguments simply weren't done at the Dorrman house. Dad was always calm and correct and there was no reason for anyone to be otherwise. Come to think of it maybe that had driven his mom nuts, too. Interesting concept, that.

With an effort Walt stood up and pushed thoughts of his family problems aside. He needed to leave all that old crap in Grantville, and preferably in the up-time *past*. He was here now, he was out hunting and he needed to get his shit together. Straightening his shoulders he marched out of the trees and headed to where Gerbald was gutting the kill. Gerbald saw him coming, smiled pleasantly at him and then went back to work.

Walt stood awkwardly for a minute then coughed. "Uh, Gerbald, I'm really sorry about that. I've been in a piss poor mood on and off lately and I shouldn't have taken it out on you."

Gerbald looked up at him with commiseration in his startling cobalt blue eyes. "It is quite all right my friend, no need to worry, I took no offense. Our hunting trip has seen more than its share of unexpected difficulties, has it not? Now, would you like to give me a hand with this? I believe you have some experience in preparing a fresh kill for travel."

Walt smiled, feeling relieved, and respectfully set about the bloody but wonderful job at Gerbald's side.

* * *

They made camp early in a nearby clearing sheltered by large venerable oaks. First they hoisted up their kill so that it hung from a high branch out of the way of night scavengers. Walt laid his tent out to finish drying in the

meadow grass, then set about gathering firewood. The sky was still clear and they would have a nearly full moon tonight; it promised to be a pleasant evening. Once they had made camp Gerbald invited him to come along for some bird hunting.

"Walt, please allow me to show you some old woodsman's tricks."

A fair distance away from camp Gerbald proceeded to set up bird snares, producing a variety of twines and carved sticks from one of his countless inner pockets. He taught Walt the basic mechanics and Walt wished that he had pen and paper along to take notes. He tried tying a few himself but they snapped too easily; it was definitely a job that required skill and practice. Gerbald's snares were truly wonders, designed so that the animal would not be injured if Gerbald chose to release it. Satisfied with their work they went back to camp to relax for a few hours before checking to see if they netted anything.

They sat quietly for a time, enjoying the tranquility of the valley. After a while Walt broke the silence. "So, Gerbald, what do you think about us crazy up-timers anyway? What's it like to have weirdos from the future land their town in the middle of Thuringia?"

Gerbald smiled. "Well, I am quite impressed of course. Not just with the wonders you have brought us but with your ideals as well. You are free people and now you are giving that gift to the Germanies. You have brought us peace. I was a soldier for most of my life and have seen much suffering. You Americans are doing many good works and personally I am grateful. Do not tell my wife but I am not much of a believer in God, certainly not in his mercies, a heresy, I know. And yet it seems you have come with a great purpose and even an old soldier like me must pause to ask if it is somehow divine."

Walt chewed on that for a while. Heavy stuff, divine saviors from the future? A bunch of hillbillies with better guns than anybody else around was more like it. But still, if he looked at things from a down-timer point of view he could see it. Medicine, science, freedom of religion. Walt was beginning to feel like a patriot in this new nation they were building, something that he had never really considered back home in the big old USA. Here was a place and time where small-town folks like himself could make a big difference. He felt pride in that. It was pretty heady stuff and a sense of excitement in the possibilities ahead had already begun to grow in him, slowly but surely replacing his extended mourning for the life left behind.

Gerbald continued. "Also, I like movies, very much. Especially Clint Eastwood films. He is the coolest."

Walt laughed. "Well, there's something we have in common. I love *High Plains Drifter*. 'This is my gun, Clyde.' When he made them paint the town red, that was trippin'."

Gerbald nodded his approval. "*Ja*, that was good. For me it is *Dirty Harry*. 'Do you feel lucky? Well, do you, punk?' I love that guy."

Walt applauded Gerbald's imitation, the guy was a natural mimic. "That's pretty good, dude! If we put a cowboy hat on you instead of that overgrown Smurf hat of yours you may just have a career as a replacement for old Clint—once we get around to making movies again, which I bet we will in a few years."

"Walt, that is my dream. I hope that it shall be; I very much want to be a movie star. Meanwhile let us see if our dinner has presented itself."



They found they had snared a male ring necked pheasant, a species that had come through the Ring of Fire. Gerbald gently let it go loose. "To honor your mother's wishes we do not hunt creatures from up-time."

Walt nodded in agreement; it was good to see so many familiar critters had come through the Ring of Fire with them and were thriving here. They made it feel more like home. There, something his mother and he agreed on, how rare.

"It's funny, those pheasants actually came to America from Asia. It looks like they're doing well here in Europe."

"A true American then," Gerbald grinned "All coming from somewhere else."



That evening they dined on something Gerbald called an *auerhahn*, to Walt it looked like a cross between a grouse and a turkey in blue-black feathers. Gerbald proved to be an accomplished camp cook, he produced a bottle of dried herbs and salts from one of his many pockets to give the feast some flavor. They stewed the bird with potatoes and carrots they had brought with them and some wild mushrooms Gerbald had collected. Walt was a little nervous about eating the mushrooms but determined that Gerbald was someone who knew what he was doing; they were delicious.

After the meal as they relaxed beside their campfire Walt reached into his pack to pull out a flask. "Hey, Gerbald, how about a nightcap?"

"A hat for sleeping? I just use this one, thanks." He pointed at the monstrous mustard mass that constantly occupied his head, apparently even when he slept.

"No, I mean some booze before bedtime. I got some quality moonshine here!" Walt produced two plastic camp cups and an unlabeled bottle of amber fluid. "This is a West Virginia hunting tradition."

"An excellent one indeed! We have a similar one—" From yet another inside coat pocket Gerbald pulled out a large flask made from some kind of a horn. "*Bärenjäger*, or 'bear hunter.' It is made from honey and a favorite of hunters."

They poured each other a cup of their respective poisons then raised their glasses in toast.

"To a successful hunt!" Gerbald offered.

"To tradition!" Walt replied.

They both drained their cup in one gulp and screwed up their faces in unison at the strange tastes.

A few rounds later Gerbald remarked "I think I am acquiring a taste for this *moonshine*. I shall have to procure a bottle back in town."

Walt regarded his cup of *Bärenjäger* thoughtfully. "I think . . . you are trying to kill me with this crazy poison. Hit me with that horn again please."

Yet a few rounds later they were swapping hunting stories, most of which were true or nearly so. Gerbald was interested in Walt's guns, a subject on which any hunter can wax poetically on.

"I got my first real gun for Christmas when I was eight years old and had been through seven years of extensive gun safety training from my dad. It was a Cricket bolt action 22 rifle, a real purdy little thing. I still take it out to plink cans in the backyard once in a while; a boy's first love never really fades. My mom told me I could shoot all the damn cans I wanted but could kill only what I was gonna eat, she didn't want me out popping off her precious songbirds. Naturally I disobeyed her and a few weeks later she caught me with a purple martin I'd canned. That night she had plucked the little sucker and served it up to me for dinner, fried with a side salad. It tasted pretty crappy but my dad made me eat it anyway, and gave me an 'I hope you've learned your lesson, son' speech—he's good at those. The funny thing is I actually respected Mom for that one. Cruel and efficient. Most of the time she was kind of a marshmallow, except when she was on me about doing my homework. Anyways, I never shot anything I wasn't going to eat again."

Gerbald smiled broadly at this tale. "Yes, your mother is a clever woman and not to be trifled with. I am pleased to count her as my very good friend."

Walt regarded Gerbald through squinted eyes. It was kind of hard to imagine *his mom* with *friends*. "So, you really *like* my mom? You don't just work for her?"

Gerbald cocked his head toward the young man next to him. "Very much so! Dore and I love your mother as we would our own little sister. She is part of *our* family now as well as yours. We know that your mother has great heart and vision. She cares about nature with a passion I have never seen before and wishes to protect it, selflessly. She has made me aware of how such things so often went in your other time... I do not wish to see all the Thuringerwald fall to the axes of progress. As hunters we should help your mother in her work so that we shall always have places like these to enjoy, and for your children to enjoy."

Walt looked a study in amazement. His mother? *Pam Miller*? With *great heart and vision*? Still, he had to admit to noticing something of a sea change in her over the last year; she certainly wasn't sitting around eating bon-bons

and feeling sorry for herself anymore. Walt knew she was actively trying to protect wildlife, putting up posters and stuff, and was writing some kind of a nature book; all of it quite surprising to her only son. His mother had managed to win the love and respect of an interesting person like Gerbald whereas back uptime they usually forgot to invite her to the office parties.

Gerbald smiled broadly at him. "Ah, you see there is more to your mother than you might have thought. Strange times can bring out the best in people. I hope you will get to know her as she is now. She certainly thinks the world of you; and yes; she is enough like you that she wouldn't say it but we can see it in her eyes whenever you are mentioned. Now forgive an old man for talking too much, that moonshine has rattled my brains. Have a good night, my friend." And with that he rose from his place by the fire, clapped Walt amicably on the shoulder and headed off to his nest in more or less a straight line.

Walt stared into the flames and thought on these things late into the night.

* * *

Walt woke up to the sound of something moving through the camp . . . something large. There was a snuffling sound and a clatter as cookpots fell over. A bear? He wondered if Gerbald was awake, most likely he would be. The moon was high and cast a ghostly white glow even through the fabric of his tent. Shortly the sounds stopped so Walt slowly unzipped the bottom of his tent to peek out. He found himself looking at an enormous head with a mouthful of wicked four inch tusks and two beady black eyes. Hot, fetid breath filled his face. A great boar, a *Wildschwein* . . . a monster. This, this was what had been watching them, what had disturbed his buck. *My God, it's HUGE!* With a trumpeting snort the head swung, tusks catching in the zippered door. The thing's strength was incredible and Walt rolled helplessly as it uprooted the tent pegs and dragged the tent sideways. Tangled in his fallen shelter Walt struggled to get free. A glancing blow hit him in the side knocking the wind out of him. It felt like a sledge hammer and despite the growing panic at being trapped he realized it must be the great boar's hoof—if it had been the tusks he would be bleeding to death now. He heard a muffled shout through the tangle of tent canvas and the boar roared in outrage. A scuffle began and was moving away from his position.



Walt tried to stay calm, systematically freeing himself from the prison of his sleeping bag and crumpled tent. At last he was able to find the zippers and peel himself out. He managed to extract his pistol belt from the mess but before he could draw he froze at the sight of man and boar dancing in a circle, Gerbald hacking away at the boar's thick hide with his *Katzbalger* shortsword as the boar tried to aim its tusks into his gut. The thing was a true monster, weighing at least seven hundred pounds and was nearly eight feet long! Walt had heard of boar hogs even bigger down in places like Texas and Florida but to his eyes the creature they faced was utterly huge. Gerbald lost his footing in the deadly dance and the boar was able to get a shot in; its enormous head caught Gerbald at the waist with the top of the snout, narrowly missing connecting with its wicked tusks. Gerbald was flung eight feet through the air, landing hard against the side of a tree. The boar lowered its head for a charge, Walt realized Gerbald was stunned and wouldn't be able to dodge in time. The next thing he knew he was shouting and jumping up and down.

"Yeaaaaah! Over here, you sumbitch!" The boar turned with an angry snort, its attention now on Walt's ruckus. It was a great gray fell beast looming in the moonlight like a thing out of legend. Walt instinctively turned and ran; there was no time to draw. He had never hunted wild boar but he

knew they were hard to kill head on, their thick flesh made a formidable shield. There was a scraggly looking birch tree a few yards ahead of him with some low branches; it was the only option he had to get clear of the charge. Behind him came the thunder of hooves, the drum beat of death on his very heels. The tree was in reach and he jumped, scrambling up into the branches with best speed, slowed by the pistol belt held tightly in one hand. Beneath him he felt the ground shake as the angry beast passed beneath seconds later. Walt scrambled higher, yelling like a madman to keep the boar's attention on him, hoping Gerbald would recover. A mad boar could be a man-killer as deadly as a bear or tiger. The boar skidded to a halt in the fallen leaves, angling around for another pass.

Walt somehow managed to get his pistol belt buckled on and the weapon drawn and cocked. He was only around eight feet off the ground and found himself wishing strongly for a bigger tree; he could feel his perch swaying beneath his weight. The boar had made its turn and was now coming fast, straight at his refuge. Walt drew a bead as carefully as he could, how could anything so big move so fast? He squeezed off a shot aimed at the eye but the bullet landed in the thing's meaty shoulder—it didn't even slow down. Cursing, Walt braced himself with his free hand; the boar slammed into the tree's small trunk with a mighty crack. Walt's stomach lurched as he felt the tree tipping backward, he lost his grip and fell gracelessly to the ground, concentrating on keeping the pistol in his grasp and pointed away from himself more than on making a comfortable landing. He impacted hard on his left side, keeping the gun above his head as stones and roots beat him savagely while he rolled. Once he came to a stop he saw a blurred figure shoot past, scarlet-stained silver caught the moonlight- Gerbald was charging the beast, shortsword raised high.

Walt found his feet again as Gerbald closed on the boar, which was somewhat stunned by the impact of its charge. This time Gerbald jumped onto its back and buried his blade deep through its thick hide behind the shoulder blade. With an ear-splitting squeal the great boar shook its head, trying to dislodge its unwanted passenger. Gerbald hung on tight to the hilt of his sword, twisting it and digging deeper into the enraged creature's flesh, his expression one of grimmest determination. Walt noticed Gerbald's ubiquitous mustard colored hat had fallen off and it made the retired soldier look strangely vulnerable. Gerbald and the boar were in a stalemate, the boar showed no signs of weakening despite the blood oozing from the sword

wound, but Gerbald was unable to get his weapon clear for another stroke without being thrown off and put back in the path of those tusks.

The sight broke Walt free from his shock. He strode confidently toward the struggling pair, holding the Smith & Wesson in a firm two hand grip. He approached from the side, the enormous creature was too busy trying to buck off Gerbald to notice him; Walt knew its eyesight wasn't too good. The great boar stopped its thrashing for a moment as Walt came in close, a beady black eye focused on him in the phantom light. Walt aimed and fired at a distance of two feet: The shot went directly through the eye. The creature heaved and bucked one more time then collapsed with a jarring thud as Gerbald jumped free. They stood staring at the now lifeless beast that had nearly killed them both, breathing hard in the chill autumn night.

At last Gerbald looked over to Walt, who still stood with his pistol aimed at the massive head. "Nice shot. Very *Dirty Harry*." Gerbald said with a pale grin.

* * *

The battle ended around three in the morning but there was no way they were going back to sleep, hot adrenaline still coursing through their veins. Walt stoked up the fire and Gerbald made some coffee, which they both drank with heavy doses of Walt's moonshine. They often glanced over at the still mass lying nearby, as if to make sure it didn't get up and move again.

At last Gerbald stood up slowly, favoring his sore back; they were both battered and bruised by the encounter. "Will you indulge an old German hunter before we begin to prepare the boar for travel?" Walt nodded affirmative. "Bring your hat, please, Walt."

Walt extracted his Grantville Roughriders baseball cap from his fallen tent. Gerbald waited for him beside a spruce tree. With his still bloody shortsword he cut off a blue needled twig of three inches. He led Walt over to the fallen boar. Leaning over the enormous head Gerbald daubed the needles with blood from beneath the boar's bullet-punctured eye. His movements were tender and spoke of a deep respect for the fallen animal; even though it had nearly killed them both it was due this. Walt was beginning to understand the German tradition of the hunt and thought of some hunters he knew back home who treated their kills as a kind of joke . . . it was only themselves they degraded, he now understood.

Gerbald took the bloodied twig and beckoned Walt to come to him. He looked Walt in the eye solemnly. "Walt, this was your kill. I now give you the *Schützenbruch* or 'shooter's branch.' Please lower your head." Walt obeyed

and Gerbald gently tucked the twig into the braided gold colored cord stretched across the top of the bill. Walt straightened.

"You were a hunter of America before, Walt. Now you are a hunter of the Thuringerwald. *Waidmann's Heil!*"

"*Waidmann's Heil!*" Walt answered, feeling pride grow in him. Hail great hunter of the Germanies!

* * *

With still an hour to go before dawn Walt looked at the giant boar, and then looked at the big buck. He looked at the giant boar again, then looked at the big buck again.

"Uhh, Gerbald, how are we going to get all this meat back to Grantville? I mean, just the buck we could've handled, but now we've got King Hog here."

"Not to worry Walt, it is quite simple. First we must do more work on our kills, removing most of the larger bones. Once we have done this the load will be sufficiently lightened. Then we will make a sled from branches and drag our prizes back down the valley. We need not return over the ridge we came in by, there is another road at the end of this valley, much closer. Once there we shall hire a passing wagon, there is always someone on the road willing to make a few extra dollars. We shall be back home enjoying pork chops before you know it!"

"You make it sound so easy."

"It won't be . . ."

It was brutally hard work. In fact, it was a back-breaking son of a bitch and it took them half the damn day to drag their prizes the two and a half miles downhill to the road, but they got there, sweating and exhausted. Not long after a local farmer wandered by in a rickety wagon to stare white faced at the massive head of the boar; now he knew what had killed his favorite dog last year and was happy to take the job. Loading the kills on was a further heavy task and the weight threatened to break the rather tired old wagon, but they slowly made their way back to Grantville, arriving just before dusk. They paid the farmer with a hefty quarter of bacon and a still shiny 1987 dime that Walt had found in his pack. Their prizes now proudly displayed on the front yard's grass, they went in to get Crystal.

* * *

"Good lord! You killed a wooly mammoth!" Crystal exclaimed when she saw the great boar's head in the front yard. Several passersby stopped to gawk and admire it.

"You're pretty close, but no trunk."

"And what's this? Hell's bells, it's a moose! Look at the antlers on that thing!"

"I think it's some kind of elk. Gerbald calls it a *Rothirsch*."

"My heavens, all this will feed an army."

"We can freeze some of it here and some at your uncle's place and I want to give some to my dad . . . and my mom. I think she'd like some of the bacon. We can salt cure some as well, and make jerky." Walt was actually starting to salivate as Gerbald prepared his knives for a further proper butchering. He looked up at Walt and Walt thought he saw a glimmer of pride there, the pride a man has in a younger man who has been his student.

"So, Walt, since you made the kills, the heads are yours."

Crystal looked at the gigantic boar head, its tusks bared in a rather sinister grin, then at the majestic tree of the stag's rack.

"Oh no, don't even *think* it." Crystal's copper pigtailed swayed as she shook her head emphatically. Walt was starting to grin.

"You know, I've always thought that it would be pretty cool to have some trophies on the wall of my den."

"You don't have a den yet! There is no way, Walt. Just forget it!"

"But honey, it's a German hunting tradition. Please, we must be respectful of traditions."

Crystal fumed and fussed, regarding the giant animal heads with a mixture of fascination and disgust. Walt and Gerbald were now deep in council, discussing the merits of various taxidermists while Crystal looked helplessly at the dead beasts she would soon be sharing her home with.

* * *

A few of weeks later Crystal found herself looking at the boar and stag's stern visages as she sat in her living room. Walt had tucked a blood-stained sprig of pine needles behind the boar's ear and told her not to remove it. Men, as it turned out were the strangest creatures of all.

Walt came out of his room carrying a rectangular box and headed for the front door.

"Where are you going, honey?"

"I have a little something for Gerbald, a thank you for the hunting trip. I'll be back in a while."

"No *problemo*, darlin'. I'll just set here with Porky and Bullwinkle for company."

* * *

Walt found Gerbald in the sunflower field that filled his mom's front yard, doing some digging.

"*Waidmann's Heil, Walt!*" he cried out cheerfully, stopping his work.

"*Waidmann's Heil, Gerbald!*" Walt answered in kind.

"Here to see your mom?" Gerbald asked with a raised eyebrow, a hopeful expression there.

Walt flushed a little. "Well, maybe I'll go up and say hello for a minute." This brought a pleased glow to Gerbald's weathered face which made Walt feel kind of good, too. "Actually, I came to see you. I have something for you, a thank you for the hunting trip." Walt handed Gerbald the heavy box.

Gerbald looked at him with surprise, feeling the weight. He carefully opened it to reveal an unusual gun, somewhere between a rifle and a pistol. Gerbald looked at Walt in surprise.

Walt pointed at the weapon.

"It's a Snake Charmer, a shotgun with a pistol grip. It's compact, lightweight and portable, good for backpacks . . . or, in your case, coat pockets. I bought it a few years back in my gun craze phase. It's a great weapon but I hardly ever use it. I want you to have it."



Gerbald gave a solemn bow. "My young friend, it is a kingly gift but I surely cannot accept. You must keep this wonderful gun for yourself and your future sons; your friendship is quite enough thanks for me."

"I thought you might say that, Gerbald. How about this, then? I want you to use it to protect my mom."

Gerbald reflected on that, holding the small shotgun reverently in his hands.

"I haven't forgotten the things you told me up in that valley. What my mom is doing to protect the environment is . . . important. A lot of people aren't going to want to hear it. She's going to make enemies. I'm really, truly glad she has you watching her back. Use this for *her*."

Gerbald nodded. "I am honored to serve her and honored to do so with her son's excellent gift."

"Thanks, Gerbald. Ya know, don't let this go to your head or anything, but . . . you really do kind of remind me of Clint Eastwood."

The older man's face glowed like sunlight. "Really? I do hope we can have a Hollywood soon, I would so very much like to be in a movie."

Walt laughed and pointed at the gun. "Okay, show me what you got, Clint."

Gerbald's eyes narrowed and he lifted the Snake Charmer out of its box, holding it with a deft grip in his right hand. He looked like a supreme badass, even with that crazy Cat in the Hat lid.

"This is my gun, Clyde."

Walt clapped his approval.

"You know, I think you've had a big hand in helping my mom find her purpose here, Gerbald. I'm still looking for mine; I guess I still have a ways to go. Meanwhile, let's go hunting again soon. Maybe you and I could make it a tradition."

"So we shall Walt, a fine tradition indeed. *Waidmann's Heil!*"

* * *

Stretching Out, Part Four: Beyond the Line

Written by Iver P. Cooper



Trinidad, April, 1634

It was a lake, but one unlike any other they had seen. This was the famous Pitch Lake of Trinidad. A hundred acres of tar.

David Pieterszoon de Vries, captain of the fluyt *Walvis*, studied it for a few moments. The lake was nearly circular, perhaps two thousand feet across, nestled in a shallow bowl at the top of a hill. The surface wasn't flat and still, like a mountain lake protected by hills from the wind. Instead, there were broad, dark folds, with clear rainwater lying in the hollows between them. David, in his youth, had worked for a bookseller, to learn English, and their haphazard arrangement remind him of marbled paper. Here and there, the folds were festooned with a patch of grass, a few yards in width, with a shrub or small tree rising above it like the mast of a ship.



For Philip Jenkins, born in twentieth century West Virginia, it awoke other memories. "This is a *humongous* parking lot."

"Sir Walter was right," said David. "Enough pitch here for all the ships of the world." Sir Walter Raleigh had come here in 1595; his sailors used its tar to protect their ships' hulls from the *teredos*, the wood borers of the tropical waters.

"We have a lot more uses for it than for caulking ships," Philip replied.

"Wait here." Using a boarding pike as a probe, David tested the surface. It seemed firm enough. He took a step forward. The tar sank slightly, but held his weight. He took a second step. No problem.

David turned his head. "Follow me. Test the ground before you trust yourself to it, there may be softer areas at the center of the lake." After a moment's hesitation, the landing party followed him.

* * *

Philip was surprised to discover that the tar didn't seem to stick to his shoes or clothing, as he would have expected. Inspected closely, the tar was finely wrinkled, like the skin of an elephant.

David and his landing party walked around a bit, then he called them to a halt. "One spot seems as good as another, so let's start here." The sailors broke up the tar with picks, then drove their shovels into the bitumen, lifting out masses of dark goo. They dumped them into the waiting wheelbarrows. Philip wrinkled his nose; the disturbance of the lake surface, had brought forth a sulphurous smell. Nor was the lake quiet; it made burping sounds, now and then.

"The lake is farting," one of the sailors joked.

Philip saw a tree limb sticking out of the tar, and tried pulling it out. It resisted at first, then emerged, a ribbon of black taffy connecting it to the lake, like a baby's umbilical cord. Philip studied it for a moment, then threw down the stick. He walked over to David.

"You know what this place reminds me of?" asked Philip. "*The Welt-Tier.*"

David puzzled over the word for a moment. "German? World-animal?"

"Yes, that's right. It was in a science fiction story by Philip Jose Farmer. The ground was springy, like this lake. When someone walked across it, it rose up, like a wave, and tried to swallow him. The land was really the skin of the Beast."

The sailors within hearing stirred uneasily. "Philip," commanded David, "you should be shoveling." Philip nodded, and took the shovel that was handed to him.

* * *

By the day's end, they had excavated a rectangular pit, some tens of feet long, and several feet deep. David decided against camping on land, it being Spanish territory, and everyone returned to the ship.

When they came back to the lake to continue their labors, they discovered that the pit had partially filled in. Moreover, some of the nearby "islands" of vegetation had moved during the night.

"The lake does act like a living thing," David whispered to Philip, "but an exceedingly sluggish one. Not like your *Welt-Tier*."

Philip didn't respond at first. "According to Maria's research notes, tar is usually what's left behind when oil escapes to the surface, and dries out." But for those islands to move, there must be some liquid circulating beneath the surface. Perhaps it's just water, but I think it might well be oil."

"So?"

"We might want to drill for oil nearby. Tar is fine for waterproofing, and roadbuilding, and making organic chemicals, but oil—the liquid form—contains the fuel we need for our APVs. Or for power plants."

"I think my patrons are planning an expedition for that purpose. But it would have to be much larger and better-armed than this one."

"Why is that?"

"We can spend a few days mining tar. Even if the garrison here on Trinidad finds out about us before we leave, their numbers are comparable to ours. We would be gone well before the Spanish can call in reinforcements from the mainland. Or rouse their Indian allies. But drilling for oil might take months, and then, as I understand it, you have to pump the oil into storage tanks. That calls for a permanent settlement. I don't see the Spanish letting any foreigners, least of all a pack of Protestants, live here without a fight."

As if David's words were a signal, they heard a whistling sound, and a moment later, an arrow seemed to sprout out of the tar some distance in front of them. The sailors dropped into their trench, which was the only nearby cover.



"Keep your heads low, see if you can spot them." As he spoke, a second arrow plunged into the lake to their left, and was quickly swallowed up. Some seconds later, it was followed by a third arrow, better aimed, which nonetheless fell short of their position.

David mentally retraced their trajectories. He realized that they had most likely come from the vicinity of one of the grassy patches he had noticed earlier. He looked for one, along the estimated path, with bushes or trees for cover. Yes, that one, he was sure of it. It was much too far away for the attacker to have expected to hit anything. They were being warned off, he concluded. Probably, given the rate and direction of fire, by a single

Indian. But it was possible that a second Indian was already running for help.

"Joris," he said, "I want only you to fire." Joris nodded, he was the best shot in the party. David pointed out the shooter's putative refuge. "Our target is there, I believe. Give him something to think about.

"The rest of you, let's gather up our tar and head for the ship. Where there's one Indian, there are probably more close by, and they probably have sent a messenger to the garrison at Puerto de los Hispanioles by now."

The men collected their tools and put them in the empty wheelbarrows. They headed slowly back to the ship, with the rear guard, led by Joris, making sure that the Indian, or Indians, didn't get close enough to be a real threat.

"Arwaca Indians," he told Philip. "When I was in the Caribbean last year, I was told that the Trinidados brought them in some years ago. The native Indians had allied themselves with Sir Walter Raleigh, so, after he left. . . ." David drew his finger across his throat. "Snick."

* * *

David, an experienced explorer, had come to Grantville to raise money and to recruit followers for a colony in Suriname. He had started up the United Equatorial Company, and found investors to put money into the venture. They had insisted that he take along a Dutch down-timer, Maria Vorst, as the expedition's science officer. Maria, whose family ran the Leiden Botanical Garden, had received training in Grantville in botany and geology.

Philip's presence had *not* been planned. He knew Maria through their common interest in plants. Infatuated, and beset by family problems, he had refused to be left behind and had stowed away on the *Walvis*. Much to Maria's surprise, because she had not realized that he considered himself more than a good friend.

While they had reached a *modus vivendi* after a few months together on the *Walvis* and in Suriname, it was just as well for her peace of mind that David had asked Philip to come with him on the second phase of his venture. Which was to collect tar in Trinidad, and rubber in Nicaragua, and, if the occasion presented itself, prey on Spanish shipping. The *Walvis*, with eighteen guns, was accompanied by another fluyt, the fourteen gun *Koninck David*, and a yacht, the *Hoop*.

* * *

They passed through the sometimes treacherous Dragon's Mouth, between Trinidad and the peninsula of Paria, without incident. Another days' sailing brought them amidst the islands which the up-time maps called "Los Testigos." Dunes several hundred feet high towered over aquamarine waters, and marine iguanas left footprints and tail tracks as they scurried to and fro.

Some didn't scurry quickly enough.

"Tastes like chicken," David pronounced, and his fellow captains, who had joined him for dinner, agreed.

"Anything to report?" he asked.

"My crew is grumbling," said Jakob Schooneman, the skipper of the *Koninck David*. "It's been more than six months since the Battle of Dunkirk, and we've done nothing to hurt the Spanish. Or to punish the English and French for their treachery."

"It's not as though we haven't been looking for prizes."

"I know, Captain De Vries. But the mood is turning fouler and fouler. We should have sacked Puerto de los Hispanioles, or San Jose de Orunã, back on Trinidad."

"And where would the profit have been in that? All they have is tobacco, and we had plenty of that from Marshall." Marshall was the leader of a small English Puritan colony on the Suriname River, some miles upstream of David's new colony.

David continued. "So why take the risk? Especially since it would spoil the Company's long term plans to take Trinidad for keeps, by putting the Spanish on notice that they need to strengthen its defenses."

Captain Marinus Vijch of the yacht *Hoop*, cleared his throat. "The men weren't that keen on your letting the English stay upriver, either."

"I know. But we're weakened by Dunkirk and we can't afford to fight everyone. The Spanish are the real enemy and we have to focus on them."

"So let's find a Spanish town to raid," said Jakob.

Marinus nodded. "Portobello," he suggested.

Schooneman protested. "Too tough a nut to crack, for a force our size."

"We could probably find some more Dutch ships by one of the salt flats along the way, recruit them."

"Rely, for an operation like that, on captains and crews you don't know?"

"Perhaps, Trujillo," mused David. "We have to go to Nicaragua for rubber, and then from there, the currents carry us up the coast anyway."

Schooneman smiled. "The gold and silver of Tegucigalpa is shipped down to Trujillo." He turned his head to look at Marinus. "Might that satisfy you, Captain Vijch?"

* * *

David brought up the sextant, bringing the skyline into view on the clear side of the horizon glass. Smoothly, he edged up the index arm until the early morning sun's reflection could be seen on the half-silvered side. He gently rocked the sextant, causing the sun's image to swing to and fro above the horizon. He delicately twisted the fine adjustment until the yellow-white disk, bright even through smoked glass, seemed to just barely graze the edge of the sea. "Mark!"

Philip had been staring at his wristwatch. He announced the time—his watch was set to Grantville Standard Time, which took into account the relocation of the town by the Ring of Fire—to the nearest minute. In return for not being unceremoniously off-loaded shortly after being discovered, Philip had offered the use of his timepiece for determining longitude.

"Write it in the logbook. Solar altitude is—" David squinted at the vernier, and read off the altitude. "Record that, too. Take that and the star shot we did half an hour ago, and calculate our position."

Philip stifled a groan. He had made the mistake of admitting that he had taken half a year of trigonometry before embarking on his present escapade. The captain had happily decided that Philip could help with the navigational mathematics.

"Boat, ho!" cried the lookout.

David grabbed his spyglass and took a look. Sure enough, a longboat with a makeshift sail bobbed in the waves, several miles ahead of them.

"That's odd," he muttered.

"What's odd?" asked Philip. Since David's cousin, Heyndrick, had been left behind at the new colony in Suriname, Philip had gradually become David's confidante on the ship. In retrospect, it wasn't surprising; since Philip wasn't a sailor, talking to him didn't create discipline problems. The fact that Philip was one of the mysterious up-timers also gave him a cachet.

"No one would willingly cross the open sea in a longboat. They are used for in-shore work by ship's crews.

"Still . . . we mustn't get careless. Many a pirate has gotten his first ship by stealing a fishing boat and then coming alongside an imprudent merchant vessel." David gave orders; the crew prepared to repel boarders. The flotilla altered course to bring itself closer to the mysterious small craft.

David hailed them. In English, since it wasn't prudent to do so in Dutch.

They responded in kind. "Help us, please, we're the last of the *White Swan*." David sent his own longboat over to inspect, and his crew reported back that they did indeed seem to be mariners in distress. Not just English, but Dutch as well. David allowed most of his crew to stand down, and the strangers were taken aboard. If David had a few men, still armed and ready, well, that was only prudent in Caribbean waters.

The longboat's crew were brought some food and liquor, and encouraged to tell their tale. Not that they needed much encouragement.

The first spokesman was the carpenter of the *White Swan*. "There were three of us, ships that is, peacefully gathering salt from the Araya flats." This was the Punta de Araya, the end of the long peninsula pointing west, away from Trinidad. "We were sent in the longboat to a little cove near Cumana, where in the past we had traded with the Indians. And sometimes with the Spanish.

"We were making our way back when we saw the attack. A squadron of six Spanish warships came through, and immediately attacked the two Hollanders.

"The *White Swan* kept its distance. I suppose the Captain, God rest his soul, must have figured the Spanish were just after the Dutch. We should've known better. Once both Dutch ships were safely in Duppy Jonah's Locker, the Spaniards came after the *White Swan*. And sent her down as well."

"So much for peace," said another English sailor.

"No peace beyond the line," David quoted. "And the Spanish think they and the Portuguese own all of the New World."

The carpenter nodded. "We stayed hidden among the mangroves—what else could we do?—until the Spanish moved west, and the sun went down. There was a moon, so we went looking for survivors, and hauled in these Dutchmen, poor wretches. They had found something to cling to, but they were still pretty waterlogged when we took them on." The Dutch survivors were still too weak to make conversation, but they nodded weakly.

"And a good thing for you that you did," David said. "Since I am Dutch, and we are under Swedish colors. Otherwise, we might be less charitable, considering how the English treated the Dutch at the Battle of Dunkirk."

David stood up, started walking back to the poop deck, stopped. Looking back, he beckoned to Philip, who had approached the carpenter. "Philip, *Bowditch* is whispering your name. You must come when he calls you." The USE's *Bowditch* was based on a couple of old editions of Nathaniel Bowditch's famous *American Practical Navigator*. The post-RoF editors left out the chapters on satellite and radar navigation and LORAN, revised the chapter on instruments to reflect what was actually available, and threw in how to calculate lunars and other useful material.

"*Bowditch* can kiss my ass," muttered Philip, but he waited until David was out of earshot. He didn't want to find out whether the captain would flog an up-timer for insolence.

* * *

According to Philip's calculations, the Company flotilla was near Isla Blanquilla, north of modern Venezuela. David's plan had been to go far enough northwest to be sure to clear Aruba and Punta Gallinus, then run down the line of latitude to the Nicaraguan coast. Finding the mouth of the Rio San Juan would then have been straightforward.

The English wanted to be taken to Saint Kitts, but that was to windward, and thus out of the question even if David were sure of a friendly reception. And the American colonies were English no longer. David told his unexpected guests that he could drop them off on Providence Island, off the coast of Nicaragua. There was a Puritan colony there. They would work as crew, in the meantime, of course.

Providence Island was only a few miles north of the route that David had planned originally. However, there was a very good chance that, on that path, they would overtake the punitive Spanish squadron, which was probably en route to Cartagena or Portobello, and more or less hugging the coast. David decided to head deeper into the Caribbean Sea before turning southwest toward Providence. Thanks to the sextant and the wristwatch, he didn't have to limit himself to latitude and coastal sailing. Wind permitting, of course.

Once the Dutchmen recovered enough to speak, they told a grim tale. Not only had the Spanish not made any effort to rescue the sailors thrown

into the sea, they had taken potshots at them, for sport. The two Dutchmen had survived by swimming under an upturned chest; it trapped air and hid them from sight.

David knew that if he had reached the area a few days earlier, his three ships, together with the two fluyts already there, might well have staved off the Spanish assault. He also knew that it was foolish to blame himself, because there was no way he could have predicted the tragedy.

That didn't stop him from fretting about it, anyway.

The crew likewise became agitated. There was talk of turning about and sacking Cumana, on the Venezuelan coast, or perhaps the Isla da Margarita behind them, but the more experienced men pointed out the dangers of being trapped against the Spanish coast if the squadron returned.

* * *

Philip was uneasy, and it wasn't only because of the Spanish galleons said to be on the prowl. David's temper had changed for the worse. Clearly, his ire had been raised by the report from the survivors of the Araya incident.

Not that David was that fond of the Spanish at the best of times. But Philip had always been impressed by David's coolheadedness. Now he was afraid that David might set aside the long-term company goals, in order to take revenge.

His musings were interrupted by Cornelis, the second mate of the *Walvis*. "Captain wants you."

Philip found David on the quarterdeck. "Sir?"

"What do you know about Nicaragua?"

"Just what Maria collected. About the San Juan river being a good place to look for rubber. She gave me a copy of the 1911 encyclopedia article. Why do you ask?"

"No particular reason. But do leave the copy in my cabin."

Providence Island, May 1634

The three peaks of Providence Island slowly rose out of the haze. David's ships picked their way cautiously through the reefs and shoals that surrounded the island, with the shallow draft *Hoop* as their advance guard. The leadsman of the *Walvis* was hoarse by the time they entered the harbor.

The English gave them a guarded welcome. They were Puritans, suspicious of royal intentions, and hostile to the Catholic powers, Spain in particular. The news of the Battle of Dunkirk, and the Treaty of Ostend, had not been well received. Still, Charles had not yet made any announcement of an intent to hand Providence Island over to the Spanish, and the islanders were determined to keep their heads down and hope the king would recognize the dangers of a Spanish alliance.

That said, they felt no need to engage in outright hostilities with the Dutch, let alone a Dutch-crewed ship flying the Swedish flag. At least until a specific royal command forced them into war.

Several Dutchmen, Abraham and Samuel Blauveldt in particular, had been intimately involved in the founding and maintenance of the colony, and Abraham was on hand to greet David.

David mentioned the roving Spanish squadron to Abraham Blauveldt, and he and David agreed that they should sail out together for mutual protection. "You collect your rubber," said Abraham, "and I will pick up some tortoiseshell from the Miskitos. It sells pretty well."

The coast of Nicaragua was 150 miles west of Providence Island, and the coastal region was dominated by the Miskito Indians. The Blauveldts, and the English of Providence Island, had quickly made friends with them. It helped that they had a common enemy. In the Miskito-English pidgin, the worst thing one could possibly say about someone was that he is a "Spanish Spaniard."

"By the way, Abraham, I almost forgot to show you. Look here." David pointed at Bluefields, perhaps eighty miles north of the mouth of the San Juan River. "This town was named after you. Really."

Abraham Blauveldt smiled. "That's worth celebrating. Where's the schnapps?"

* * *

The English ship's carpenter decided to stay with the *Walvis*. "I'd like to see those rubber trees of yours. And I would even more like to have a chance to pay back the Spanish for what they did to the *White Swan*. You're gunning for the Dagoes, aren't ye?"

"Yes, indeed. And of course, they're gunning for us."

* * *

The final addition to their crew was the least likely: a preacher, Samuel Rishworth. He had approached Philip to find out the up-timers' views on the issue of slavery. What he heard pleased him, and he explained why.

Providence Island had started importing slaves the year before. Rishworth's views on the matter had gotten him in trouble with the local authorities. First, he preached against slave-owning. But the company insisted that slavery was lawful for those who were "strangers to Christianity."

Rishworth shrugged. "So God's will was clear to me; I needed to preach the Gospel to the slaves. And tell them that if they became Christian, they could insist on their freedom."

"I bet that went over well."

"I was warned that I was 'indiscreet,' that I should not have made 'any overture touching their liberty' to the slaves, without the permission of their masters."

"Right," said Philip. "So what happened next?"

"Oh, the number of slaves who escaped into the woods increased. Not that I had any idea of how they managed it. No idea at all."

"No idea at all," Philip echoed.

"Of course, getting them off the island is a more difficult matter."

"Can they swim?"

Rio San Juan, and the Miskito Coast, Nicaragua

"Rubber collecting going well, Philip?"

"Well enough." The fugitive slaves from Old Providence Island were willing to work, at least after Rishworth had a word with them, but they were few in number. While the Miskito were willing to cut trees—the fact that it involved using an axe made it a warrior activity—that was only if there weren't something more interesting to do. If they got bored, they would go off hunting or fishing, or just doze off in hammocks, and there was nothing Philip could do about it. And that wasn't the only problem.



"I am worried about the waste," Philip admitted. "Cutting down these *Castilla* trees, I mean. Yes, we get a lot of latex out of them all at once, but if we could just tap them, we could keep coming back each year for more."

"It's not practical, Philip. This is too close to Spanish-controlled territory. All they need to do is put a real fort at the mouth of the Rio San Juan, and the rubber trees will be as inaccessible to us as if they were on the Moon. And I really can't shed a tear over depriving the Spanish of their *Castilla* trees."

"Well, if they don't build that fort, it means that next time we visit, we're going to have to go deeper into the rainforest to find more trees."

"We'll deal with that if we must."

* * *

Philip brooded about the problem. He wasn't worried about the yet-to-be-built fort—he figured that in a few years, the USE would have battleships in the Caribbean, and that would solve *that* problem. But battleships couldn't grow back trees that had already been cut down.

He decided to experiment. He had one of the Miskitos cut V's into the bark, not just near the ground, but all the way up the trunk. The "milk", as the Miskitos dubbed the latex, came running out. A tree with a five foot diameter might yield twenty gallons of milk. Which was about as much latex as they collected the original way. Whether the tree would in fact survive the heavy cutting, he couldn't be sure. What he was sure was that it wouldn't survive being felled. So this had to be an improvement.

It had the unexpected effect of increasing his labor force. His original guinea pig was one of the topmen from the *Walvis*. Accustomed to climbing a seventy five foot mast, he wasn't exactly afraid of heights. The novelty of Philip's experiment attracted observers, both Dutch and Miskito, and Philip overheard what they were saying. And decided to stage a race. The *Walvis* beat the *Koninck David*.

Then the Miskitos wanted in. They had their own climbing tricks. There was a risk of falling, of course. A mature *Castilla* was many feet high. But so far as the Miskito were concerned, the risk was what made the new rubber tapping a *desirable* activity for a warrior.

* * *

Rather than draw on the ships' provisions, David preferred to pay the Miskitos to hunt for them. The Indians ranged along the coast, and up the river, bringing back turtle meat, fish, fowl and other dainties. Blauveldt had told David that in their home territory, two Miskitos could feed a hundred Europeans. It wasn't much of an exaggeration.

* * *

"One of the hunters is back, seems anxious to speak to you, Captain," Cornelis reported.

"Bring him by, let's find out what he has to say." David was sitting on the stump of a rubber tree, munching on some fruit.

The report brought him to his feet. "Cornelis, pick the steadiest men. Have them go around, tell the other captains to have their men to quiet down, collect weapons, and assemble by the canoes. There're Spanish upriver."

David pulled a ring off his finger, and handed it to the hunter. "For you, good work!"

He then turned to Philip. "Go with him, get the Miskito chiefs together."



Some minutes later, there was a quick Dutch-Miskito council of war on the bank of the Rio San Juan. The Dutch, with swivel guns brought over from the ships, blocked the path downriver. The Miskitos fanned out in small groups, heading into the rainforest. They would cut off the Spanish escape route.

The ambush was completely successful. It was also completely anticlimactic. The two mestizos the Indians had spotted weren't scouts for a Spanish expedition. They *were* the expedition. In a manner of speaking.

More precisely, they were stragglers from a canoe convoy that had come down the river some months earlier, at the end of the last rainy season. The two had gone hunting one day, gotten lost, and discovered, when they made it back to the river, that they had been left behind. They had built a raft and tried paddling upriver, but decided eventually that it was too difficult and headed back downstream.

The mestizos were from the town of Granada in the interior of Nicaragua. Their convoy's cargo was their region's annual export of cochineal, sugar, indigo, hides and silver; it had been headed for Portobello, 300 miles to southeast. There, it would have been transferred to the great *flota*, which sailed in January or February to Cartagena, Havana, and finally home.

There was much moaning and wailing among the Dutch when they realized that they had missed an easily captured treasure by just a few months.

The Miskitos were disappointed, too. While the Miskitos did cultivate crops, their general altitude was that it is easier to let someone else do the farming and then rob them. In this regard, they were not very different from their English and Dutch allies.

* * *

David thought about the treasures of Granada, and its sister city, Leon. He couldn't afford to hang around the mouth of the San Juan until next December or January, waiting for the 1635 convoy. His investors would be unhappy about the delay in the delivery of the oil, rubber and bauxite, and a wait would increase the danger that a roving Spanish squadron would spot his ships.

But . . . If the convoy left the town half a year ago, that meant that the town's warehouses were half-full again. Right?

Could he ascend the San Juan and assault the two cities? He had started the voyage with perhaps one hundred sixty men. Some of those had been left behind in Suriname, to help the colonists; others had died, through accident or disease. If he were to be away from the ships for a month or more, he would have to leave a strong guard behind, or he could return with much loot, only to find that he had no ships to sail home in. So that meant oh, perhaps, a hundred effectives. That was the bare minimum.

But if Blauveldt joined in . . . and the Miskitos . . . he might reasonably lead two hundred men into action. That made the idea . . . quite practical.

* * *

"Captain?" Philip was anxious to report on his successes.

The captain stared into the forest, without a word.

"Captain?"

David grimaced. "I have rethought the situation. We have done enough rubber collecting. It is time to take more direct action against the Spanish."

"The USE military use rubber—"

"Yes, yes, it will be used by your APCs. But we Dutch need to damage the Spanish more . . . directly. The Spanish are confident they can do anything they please with our ships and colonies, because they are winning the war in Europe. We need to remind them that the Dutch are not impotent."

"This expedition is funded by USE investors, and flies the USE and Swedish flags."

"And carries Dutch captains and crews. Who want to see the Spanish taken down a peg. Which will make both the Swedes and the Americans happy enough."

"So this is what we will be doing. We will take canoes up the Rio San Juan, to the Lago de Nicaragua. And across it . . . to Granada and Leon."

"They are towns rich in silver and other treasures. They have never been attacked, and hence are unwalled and poorly garrisoned. I feel confident that they will pay a heavy ransom to be spared the torch."

It was Philip's turn to stare silently at the wilderness.

David put his hand on Philip's shoulder. "You Americans don't seem to have much taste for plunder, I know. When I formed my Company, I was shocked by the up-time lack of enthusiasm for privateering." He stifled a chuckle. "Of course, the down-time investors made up for it."

"So don't worry. I don't need to take you with me. I have to leave a guard for the ships, and I will give you a few additional men to help you continue your rubber harvesting. The ones too old or too sick to be fit for my little excursion to Granada, of course. And you will have some of the Miskitos."

"How long will this take? I am no expert on the Caribbean, but I do know that the hurricanes come in August and September."

"Oh, we'll have you back in the Thuringen Gardens, with your friends buying you drinks, and an admiring young fraulein on your lap, well before then."

* * *

It didn't work out that way. Blauveldt urged that they if they couldn't wait for the 1635 convoy to come to them, they could at least give the Granadans a few more months to accumulate treasure. Besides, if they waited, he could sail up to Bluefields, and Cabo Gracias a Dios, and recruit more Miskito allies, increasing their chance of success.

The Miskitos told the Dutch that there were several rapids upriver, and that it would be best to make the journey to and from Granada when the rains elevated the water level—July or August.

The captains finally agreed to launch the attack in July—virtually guaranteeing that David would be returning to Europe during the height of hurricane season. Not that David seemed especially worried. "There are only four or five hurricanes a year in the entire Atlantic."

Nor could Philip conduct rubber tapping business as usual while David was off freebooting. The nigh-universal Miskito reaction was, "You expect me to fuss around collecting sap from trees when I could be impaling a Spaniard or two on my cane lance? And when your Admiral David says that we can keep the Spanish guns and ammunition we capture? You are a funny boy." It was also quite apparent that Philip would diminish in their esteem if he remained behind.

"Arggh," said Philip to the jungle. "Now all I need are a parrot and an eyepatch." The jungle didn't answer.

July, 1634

At last, Blauveldt's ship glided back into the mouth of the San Juan. Some native canoes were carried on its deck, which was crowded with the new Indian recruits. The canoes and longboats were lowered into the water, and they all joined David's group.

The assembled crews and their Indian allies milled about in excited confusion as they waited for David and his fellow captains and chiefs to give the order to begin the ascent. Philip watched as first one, then another alligator wriggled out of the water and onto a sandbank some yards away. Soon, a score of the big reptiles were sunning themselves. Most of them had their mouths agape.

A sailor from Blauveldt's ship was sure of the reason for this behavior. "They hold their mouths open so as to catch flies," he sagely remarked. "The saliva attracts the insects, and they swallow 'em when enough have landed."

"That makes no sense," said Philip. "Look how big they are! How many flies would an alligator have to catch in a day to keep himself alive?"

"Are you calling me a liar?"

"Certainly not. I'm just pointing out that you are being illogical."

"I think you're calling me a liar." He put his hand on the hilt of his cutlass.

There was a cough behind him. "Is there a problem?" asked Cornelis, his own meaty hand squeezing the man's sword arm into immobility. He was heavily built for a sailor; the sort of fellow who, had he gone to high school up-time, would have acquired the nickname "Tank." He had his share of knife scars and powder burns, too.

Mr. Fly Catcher turned and gave Cornelis a slow once-over. His face took on a more calculating look. The sailors nearest him edged away, ever so slightly, and he shrugged. "Just a friendly conversation."

"That's what I wanted to hear. But we talk when there isn't work to be done. Should I find some work for you to do?"

Fly Catcher shook his head, and, as soon as Cornelis released him, sidled away.

"Thanks," said Philip. "That wasn't looking good."

"Captain told me to look out for you, you being so knowledgeable in some things, but mebbe not in others."

"I was just explaining about alligators."

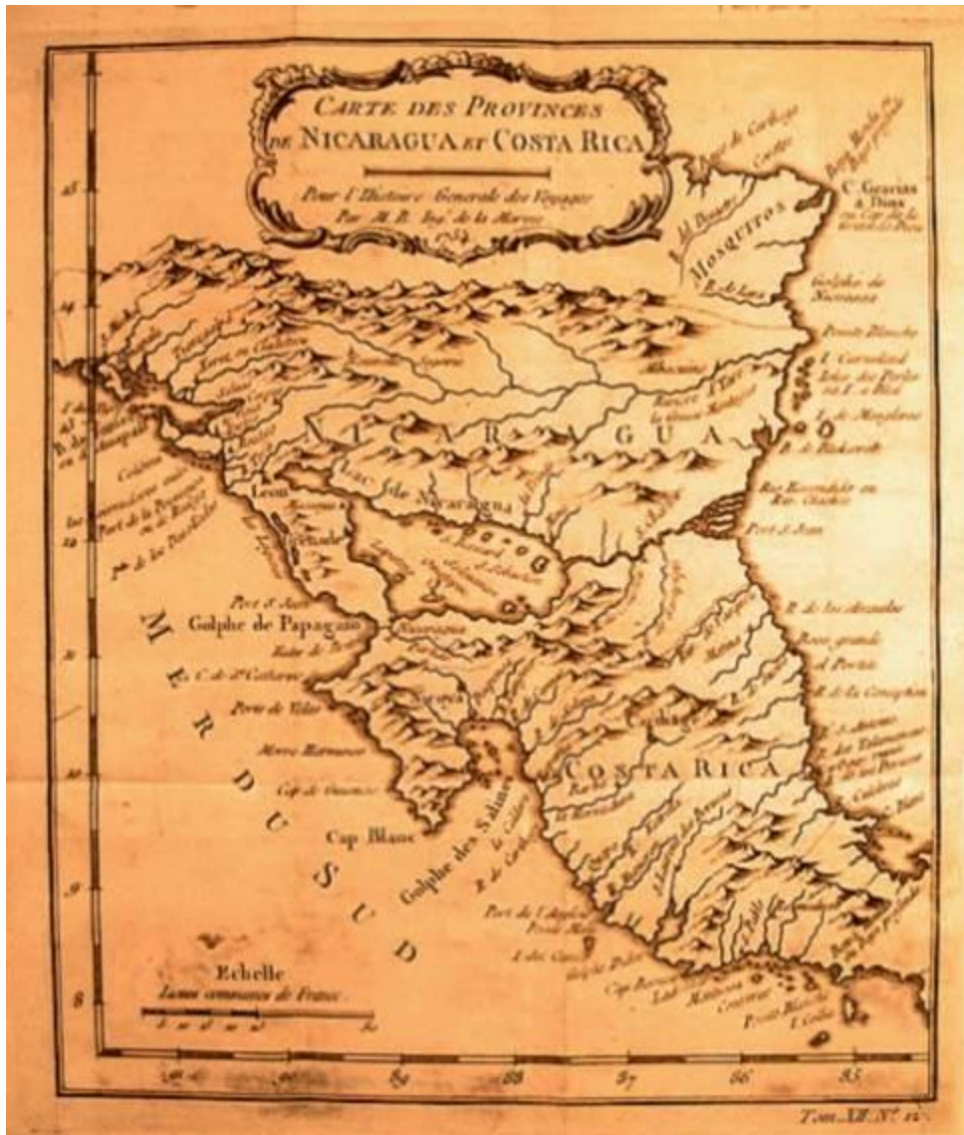
"Captain also said that if you talked someone into blowing your head off, I was to make sure I retrieved your wristwatch. You want to show me which arm you keep it on, to save me some time?"

* * *

While Philip was still worried about whether hurricanes would interfere with their return to Europe, he was happy enough to be ascending the Rio San Juan during the height of the rainy season. The rapids were bad enough even at high water; he didn't like to think about what they would have done to the canoes if the rocks were exposed.

Seeing the rapids reminded him of Maria. "She'll be so freaking mad to find out that she missed out on the chance to run some whitewater," he mused. "On the other hand, I am not sure she fancies playing Anne Bonney, so perhaps it's just as well."

* * *



The source of the Rio San Juan was the Lago de Nicaragua. Were it not for the maps, they would have thought that they had reached the Pacific Ocean. To their left, they could see nothing but water. Ahead, looking northwest, were several small islands, the Solentinames. Beyond them lay the cone of Ometepe, and further still, as far as the eye could see, more water. On their right, the lake was hemmed in by a long chain of cloud-capped mountains, but of course you could say the same about the Pacific coast of Peru or Mexico.

The oceanic impression was reinforced when the Dutch-Miskito expedition spotted the telltale dorsal fins of sharks. Bull sharks did enter rivers, but they were now almost a hundred miles from the Atlantic.

The only sign that they were on a lake was that the water was fresh, not salty. No one expressed an interest in swimming.

"About a hundred miles to Granada," David told the other leaders. "I don't know how much lake traffic there is, so we'll hide by day, and paddle by night." They didn't argue. The greatest weapon in warfare was surprise.

"Do your maps show good hiding places along the coast?" asked Blauveldt.

"They're not that detailed. But we have three choices. We can hug the southwest shore. I'm afraid that might be populated, because the land is flat."

"So that's out."

"Or we can go along the northeast coast. There's just a narrow strip of land between it and the mountains."

David swatted, ineffectually, at a mosquito which had dive-bombed him. "But the route I favor is almost directly across the lake."

"Short, but won't we be seen?"

"Besides these specks in front of us"—he pointed at the Solentinames—"there are two big islands along the way. The second gets us to perhaps twenty miles from Granada. Then we can edge a bit west, to put a little cape between us and the Granadans, and once we round it we're only five miles out."

"Sounds good to me. We could cut across the cape, if that would keep us out of sight longer."

"We'll have to see. It looked like there might be a mountain spur there. That could turn a short cut into a long cut."

The sun set, and the canoes advanced. They fought to avoid a westward drift; the waves came mainly from the east, no doubt driven by the trade winds. That, too, was a sign they weren't on the Pacific.

It took another week to cross the lake. Several times they encountered fishing boats, but none were allowed to escape and bring warning to unsuspecting Granada. Granada had been founded in 1524, and it had never been attacked by a European force. No mother of Granada warned children that if they didn't go to sleep, the English or Dutch would eat them.

Granada, Nicaragua

David's raiders made the final advance in the darkness and solitude of the wee hours. The city was unwallled, so they marched directly to the great plaza. The few soldiers in the barracks were forcibly awakened, and placed under guard. The powder magazine was emptied. The cannon in the vicinity were appropriated and set up to command the plaza and its approaches.

By the time the civilians knew that there were invaders in their midst, it was already morning. The rays of the rising sun gave the stone outer walls of the Granadan buildings a golden glow. David hoped that this was a portent that they would find gold inside, too.

Several detachments guarded the entrances to the city, to make it more difficult for the inhabitants to escape with their valuables. Others patrolled the main streets and, as the Granadans emerged from their homes, prodded them toward the plaza and into the cathedral. It was soon filled with hundreds of citizens. Some screamed imprecations at their captors, some wept, and others just sat in a state of shock.

The Miskitos had, by this point, taken possession of the weapons in the armory, and were happily firing their weapons at Spaniards so imprudent as to poke their heads out of a door or window, or, if not given the opportunity for such sport, into the air. David's control over them was tenuous, and he thought it best to give them the chance to work off their excitement, as long as they didn't resort to wholesale slaughter.

The Dutch, on the other hand, were more interested in collecting plunder. They did it systematically, starting at the cathedral and the city hall, and then checking out any building which looked well-appointed enough to warrant investigation.

Nor were the Dutch and the Miskitos the only ones taking advantage of the helplessness of the town. The native Indians, and black slaves, had clearly decided it was payback time. It was futile for a resident to protest that he or she was penniless, or that all his or her valuables had already been taken, for a slave or servant would happily deny the protest, and guide the invaders to the missing items. Perhaps collecting a finder's fee in the process.

* * *

When the looting was complete, the invaders cheerfully recruited the townspeople to act as beasts of burden, making them tow the municipal cannon to the lake, and dump them in. Much to the amusement of their former servants and slaves. The invaders also seized the boats at the waterfront, to prevent pursuit and also to transport more treasure.

Some of the local helpers decided that the invasion offered an excellent opportunity to permanently leave Spanish service. A few decided to see what Miskito or Dutch life had to offer; the rest fled to the hills.

David and the other leaders then had to decide whether to continue on another sixty or so miles, to Leon. Like Granada, Leon had never been attacked, and it lay even closer to the great silver mines of Nicaragua. It was tempting, and, curiously, even the Granadan merchants urged them to do this—apparently there was a serious rivalry between the two cities.

But David knew that some of the Granadans had fled the town. An unwallied place was easier to capture, but harder to then bottle up. David had to assume that word of the sack of Granada would reach Leon ahead of his force, even if they commandeered every nag in Granada. And as a practical matter, they were going to be hard-pressed to get all the Granadan treasure safely across the lake, and over or around the three rapids of the Rio San Juan.

Regretfully, they decided to save Leon for another day.

* * *

The Miskitos hadn't gotten much of the treasure, but were happy enough with all the ironmongery they had collected. In general, the Miskitos had an extraordinary desire for European goods. David had told Philip that most Indians work to earn a handful of beads, or a knife, and that accomplished, disappear into the forest, never to be seen again.

The Miskitos, in contrast, had an insatiable demand for everything European. Weapons, clothes, tools. But the holy of holies, so far as they were concerned, was a firearm. Philip could just imagine them back home in Grantville, discussing the relative merits of a bolt-action Remington Model 700 versus a lever-action Marlin Model 336. For hours.

A few were so fascinated by the really big guns—the cannon—that they joined the crew of the *Walvis*. Considering their skills as small boat handlers and fishermen, David was happy to have them aboard. He promised that they would have passage when the *Walvis* went back to Suriname, to bring the colonists more European manufactures.

* * *

"The Puritans aren't going to be happy, you know," said Blauveldt.

David raised his eyebrows. "Why not? They don't like the Spanish anymore than we do."

"While they befriend the Miskitos in almost any way they can, there is one important exception—they never, ever, give them firearms. As a matter of policy."

"Well, then, maybe the Miskitos will decide that we are better friends than the English. Isn't that just too bad."

Mouth of the Rio San Juan

David was sorry when Blauveldt sailed off, but Rishworth and his charges were delighted. Rishworth had kept them hidden on the *Walvis* when the sailors and Miskitos were assembling for the ascent of the Rio San Juan, fearing that Blauveldt might recognize them as fugitive slaves and insist on returning them to Providence Island. Life had been a bit more relaxed for them while Blauveldt was off on the expedition to Granada, but they had to keep looking over their shoulder, so to speak, so that they wouldn't be surprised by his return. Of course, there were some Miskitos that hadn't gone off a-plundering, and they were recruited to serve as Rishworth's early warning system.

When the Indians came in with the news that the returning warriors and sailors were only a day's journey away, Rishworth hurried his people back onto the *Walvis*.

Once Blauveldt's ship had disappeared over the horizon, the ex-slaves broke into an impromptu dance, much to the bemusement of the *Walvis*' crew. David let it go on for a few minutes, then had a quiet word with Rishworth. Rishworth told them that their choices were to disembark and stay with the Miskitos, or join the crew of the *Walvis*. About half decided on the latter.

Rishworth was pleased. He would have more time to teach them the Gospel.

August, 1634

At Sea

David led his little squadron through the Yucatan channel. The wind freshened, and David ordered the sails reefed. That is, part of the sail gathered up, and tied to the yard by a small cord attached to the sail. Reefing was, for lack of a better term, a "new-old" idea. It was something his great-grandfather had done, but in David's time it was out of favor. Instead, early seventeenth century ships normally carried small courses of sail, and added additional pieces if the air was light. The nautically minded up-timers thought it was crazy to fool around with adding these "bonnets" and "drabblers." The more "progressive" down-timers, like David, had switched over to large courses with "reef points." But David predicted that

in his own great-grandchild's generation, there would still be old salts who insisted on bonneting.

As they emerged from the strait, they sighted a ship, hull-down. It disappeared from view without revealing its identity. While it was probably Spanish, given that it was heading west, David saw no reason to risk a fight when his ships were already chock-full of treasure, and the stranger couldn't possibly reach port in time to give a timely alarm. Anyway, David figured it was a straggler from the New Spain flota, bound for Veracruz. If so, it was carrying immigrants and manufactured goods, not treasure.

As they bore eastward into the Straits of Florida, David kept his ships as far from Havana as practicable. The Spanish intermittently posted a *garda costa* there, and he wasn't looking for trouble. He cleared the Straits without sighting anything more ominous than a pod of dolphins, who rode in the *Walvis'* wake for a while.

David was feeling quite pleased with himself.

* * *

The three ships threaded their way between Florida and the Bahamas. They had to claw their way northward, close-hauled, fighting against the northeast trades. But at least they had the Gulf Stream to help them along. As they struggled to wring what progress they could against the unfavorable wind, the captains and crews could take comfort in the knowledge that they would eventually escape the zone in which the trade winds, which barred a direct course to Europe, prevailed. Once they reached the forties, they could pick up the westerlies and head for home.

The wind became very light and variable, further reducing their headway. That was common when one passed between the two wind zones, but at this time of year, the area of transition usually lay further north.

Fortunately, the skies were mostly clear, and the barometer had risen slightly since the last watch. The barometer had once hung on the roof post of a Grantville porch, and David had been very pleased to have it loaned to him.

Soon after they passed the latitude of the northern fringe of the Bahamas, the northeast wind resumed. David didn't like the look of the sea, however. The swells seemed a bit heavier and longer than usual. He took out a one minute sand clock and counted the swells. Four a minute. Eight was norm.

"Go check the barometer again!" David ordered.

"It's level," Philip reported. "But it seems . . . jittery."

* * *

The next day, at sunrise, there were white wisps of cirrus clouds, low in the sky. The "mare's tails" seemed to point southeast, and the swells were stronger. The barometer had slowly fallen during the night watches. It usually dipped a bit twice a day, but this seemed to be something more than the usual variation.

"Well, Philip, I am afraid that I think we have a hurricane approaching. The winds are from the north-northeast, and since they spiral counter-clockwise about the center, the center should be nine to twelve points off the wind direction. Probably southeast."

"So what do we do? Run to the west?"

"How sure are you of the accuracy of the cross-fix you took earlier today?"

"Pretty sure. Two star fixes and a sun fix, perhaps an hour apart. Why?"

"If I trust the last position fix you took—and I do—we don't have enough sea room between us and the American coast. Only about a hundred miles. Believe me, you don't want to be near a lee shore in a hurricane. So running west, toward land, really doesn't appeal to me."

"Then should we stay put? Throw out an anchor or something?"

"It's not so simple. According to the *Bowditch*, the paths of Atlantic hurricanes are quite idiosyncratic, but they usually move northwest in the Greater Antilles. Sometimes they'll make landfall and disintegrate, but they can also curve north. And they can then recurve and head northeast.

"If I knew that the hurricane was marching northwest, I would head south, and go back the way we came, into the Gulf. And if I thought it was curving north, or recurving northwest, I would head north. Or just heave to.

"What about heading east, or northeast, to get more searoom?"

David shook his head. "That's likely to bring us into what *Bowditch* calls the 'dangerous semicircle,' the area to the right of the hurricane track. Assuming that we're not in it already, of course."

"Why is it dangerous?"

"The wind strength is the sum of the revolving wind, and the forward movement of the storm. And in the forward quadrant, the winds try to push you right into the path of the hurricane."

"Ouch. So there's a 'safe semicircle'?"

"*Bowditch* prefers the term, 'less dangerous semicircle.' Nothing about a hurricane at sea is "safe." Anyway, I am going to keep heading north for a little while. Or as close to north as the wind will let us. We're square-rigged, so we can't point close to the wind. No closer than six points of the compass."

Philip scrunched his face momentarily. "Six points from north-northeast, that's northwest. So we're heading toward the coast?"

"Edging toward it," David admitted. "Remember, the coast is curving away from us as we go north."

"We won't outrun the storm, but that course will still buy time for us to figure out which way the hurricane is moving. Right now, we're playing a chess game with the hurricane, but one in which we can't see its moves."

"Anyway, I want get away from the shallow waters between Florida and the Bahamas. Those are more prone to breaking if the wind picks up. And the *Walvis* won't like it much when some breaker drops tons of water on its deck."

* * *

David and his mates started giving orders to prepare the ship for the hard blows to come. The crew cleared the scuppers, and checked that the pumps were working. They battened down the hatches, and set up life lines on both sides of the deck.

* * *

They cautiously continued north, or more precisely northwest by north, making slow progress against the wind. The winds backed to north by east, so they had to angle even more to the west in order to make headway.

Still, the wind change was good news; it meant that they were in the less dangerous semicircle. If they were in the middle of the ocean, their best bet would have been to put the wind broad on their starboard quarter, and edge out. Unfortunately, if they did that here, they would soon be enjoying an unplanned American vacation. So they left the wind further aft, angling just enough to counter the inward spiral. The *Koninck David* and the *Hoop* did their best to follow the *Walvis*' lead. The chop of the water increased as the new swell fought with the old one.

* * *

The sun looked down on them through a white gauze. Despite their plight, Philip couldn't help but admire the halo it had acquired. The ring proper was bright white, with an red fringe on the inside. The sky was

darkened for some distance further inward, and a vaguely defined corona played outside the halo.

Gradually, the sun faded from view. Then a new layer of clouds slid under the old one, darkening the overcast. The sky was a virtually uniform grey. The main topsail split, fabric streaming out like ribbons from a running lass' hair, and the topmen bent in a replacement, and close-reefed it.

It started to rain, tiny droplets which seemed to hang suspended in the air. All at once, there was a downpour, as though someone had suddenly emptied a bucket on Philip's head. It ended within minutes, and the misty not-quite-rain returned. Then came another rain shower.

The wind strengthened. There were many "white horses"—foaming wave crests. The sailors took down the normal sails and raised the storm sails, which were made of a heavier, tougher fabric.

Soon, on the eastern horizon, Philip could see a dark mass of clouds, looking like a sorcerer's fortress, with a parapet of black cotton. If, that is, any fortress had pieces of itself break off and fly away from time to time. That was the "bar," the main cloud mass, where the winds would be strongest.

Not that they were gentle where the *Walvis* and its comrades struggled. The winds were now gale force, and the sea was heavy. The timbers moaned like lost souls. There were flashes of lightning to the east. The only good news was that the barometer was low, but steady. That implied that they were succeeding in keeping their distance from the eye of the hurricane. Philip was sent to join the group who were straining at the whipstaff, keeping the ship on its course.

The stays hummed like a swarm of angry hornets, but they all held.

* * *

"Winds come around to the northwest, Captain," said Cornelis. "Slackened some, too."

David thought this over. Being an old Asia hand had its disadvantages when you were north of the equator; he had to keep reminding himself that almost everything about typhoons was reversed up here. Northwest, yes, that meant that the storm center was now ahead of them. In effect, the hurricane had swept them up, like an unwilling partner at a dance, and swung them a quarter circle around itself as it continued its journey northward.

"How's the barometer, Philip?"

"Rising, sir." The relief in Philip's voice was evident. And that was fair enough, the pressure change confirmed that they were now in the rear half of the storm.

David sent Cornelis to take a sounding; he didn't want to shoal after surviving this much. And he detailed a half dozen men to act as lookouts, both to watch for danger, and to determine whether the *Koninck David* and the *Hoop* had also weathered the storm.

They soon caught sight of the *Koninck David*, so it, at least, was safe. However, it signaled that some of its precious water casks had been swept off the main deck, and it would need to detour to the American coast to make amends.

There was no sign of the *Hoop*. Whether it had sunk, or merely been driven far away by the tempest, David had no idea.

But there was work to be done. A lot of it. The storm sails, especially the fore staysail, were now somewhat the worse for wear. The fore staysail had so many eyes that Philip likened it to what he called "Swiss cheese." One by one, the crew unbent the storm sails, and set reefed ordinary sails. They found that a stay had stranded, and replaced it, and generally put the ship back into order.

The wind abated further, and they were able to shake out the reefs. But while the ship now looked much as it had before the hurricane, the storm had exacted a toll.

"All hands, bury the dead," David ordered. Here was a sailor who, weakened by some tropical disease, had died of exposure. There was one who had fallen from a spar while trying to put another reef into a sail. A third had been picked up by a rogue wave, and had his skull dashed against a mast. Their bodies were sown up in their hammocks, and double shotted. The Reverend Rishworth conducted a memorial service. Then, three times, David said the words, "We commit his body to the deep." Three times, a corpse was slid into the waters. There, according to the minister, "to be turned into corruption, looking for the resurrection of the body when the sea shall give up her dead."

After a short but uncomfortable silence, the crew was sent back to work. "Hands to braces," David ordered.

The next day, they found the *Hoop*. It had lost a mast, and was traveling under a jury rig. The flotilla headed for the Georgia coast, to take

on fresh water and make those repairs best carried out at anchor. The local Indians didn't attempt to trade, but at least they didn't attack, either.

* * *

It was a beautiful day, the hurricane had moved on or fallen apart, the ships had resumed a northward course and were now happily ensconced in the Europe-seeking westerlies, and David was once again at peace with the world.

Philip's navigation had been spot-on, and David invited him to dinner as a reward.

"You know, Philip, it would be bad for discipline for a captain to apologize for an error."

"Yes, sir."

"Like delaying a return trip until the hurricane season was upon him."

"Yes, sir."

"How's the schnapps?"

"Fine, sir."

Late 1634

David and Philip stood in line, waiting for their turn to send radio messages to Grantville. They were at the USE military's radio post in Hamburg. While most of the radio traffic was of an official nature, the post did send private messages on a "time available" basis.

"Philip, I know you expected to go into the army after you finished high school, but I think you'd make a fine navigator, if you'd like the job on a more permanent basis."

"Thank you, Captain. Do you believe in reincarnation?"

"Like the Hindoos? Certainly not, I am a good Christian."

"Well, then it's a moot point. Because when I get back to Grantville, my parents are gonna *kill* me."

* * *

To be continued

Sonata, Part Two

Written by David Carrico

Movement II—Andante espressivo
Grantville - Monday, January 9, 1634

Franz looked at his traveling companions, and Maestro Carissimi. They were standing outside the office of Lady Beth Haygood, talking and waiting for Hermann. As Marla turned to ask *il maestro* a question, Franz smiled to himself. He remembered Marcus Wendell's reaction last Friday when he mentioned that he found it odd that an English noblewoman was serving as Frau Simpson's aide.

"Who are you talking about?" Marcus' brow had furrowed, indicating his perplexity.

"This Lady Beth Haygood," Franz had replied. His brow furrowed in turn, as Marcus had burst into laughter.

"Lady," Marcus had finally said, after his hilarity had died down, "is her name, not a title." Franz had looked very confused, he was sure. "Oh, yes, it really is. Americans sometimes name their kids the strangest things. I had a friend in college, a boy from Alabama, whose name was Colonel A. Johnson. He caught a lot of flack from the ROTC guys. Go slip Tom Stone a few beers some night, and see if he'll tell you what his sons' given names originally were." Marcus chuckled again. "Just say her name—ladybeth—really fast like it's one word."

Just as Franz was remembering his friends' reaction when Marla had shared the story of his confusion, Hermann arrived. Shaking off his reverie, Franz said, "Hermann is here, and he was the last. Let us discover what Frau Haygood has in store for us." Opening the door, he led the way into the small room. The woman at the desk, presumably Lady Beth herself, looked up as they trooped in. She was an older woman—older than Marla, anyway. Franz refused to try and guess at her actual age; most of the Grantville women wore their ages well, and he had embarrassed himself more than once when age had entered into conversations.

"Hi, Lady Beth," Marla sang out as she entered and closed the door behind her.

"Hey, Marla." Franz continued to study Lady Beth. He had probably been introduced to her at some point—if at no other time, then during their wedding reception, he was sure—but she was not familiar to him. He saw an oblong face, like so many of the Grantvillers, framed in shoulder length

wavy dark blonde hair. She wasn't a pretty woman—with a strong jaw and a strong nose, perhaps the best that could be said was she was attractive—but her blue eyes and warm smile were welcoming on this cold Monday morning.

"So, what's up?" Marla asked. "We're supposed to be on the road pretty quick."

"Well, I think you're going to have to change your plans somewhat." Lady Beth looked around at the group. "Mrs. Simpson told me to work with you to set up some musician recruiting trips to Mainz, Stuttgart and Saxony. However, according to some information that DonFrancisco provided to me this weekend, the Elector of Saxony's orchestra is not in Saxony right now."

Not in Saxony? Franz looked at the others, knowing that he probably looked as confused as they did. "If they are not in Saxony, then where are they?"

"According to DonFrancisco . . ." Lady Beth picked up a piece of paper and read from it, ". . . the Elector's musicians, including *Kappellmeister* Heinrich Schütz, appear to all be in Copenhagen, involved in the upcoming wedding celebrations for Prince Christian of Denmark and Princess Magdalene Sybille, the Elector's daughter."

"Oh," was all that Franz could say. Nonplussed, he looked at his friends. They looked back, equally at a loss for words. They all knew of Heinrich Schütz, who was perhaps the preeminent musician in the German territories, but none of them had ever had any contact with him. If he himself had traveled from Dresden to Copenhagen, then it was certain that no musician of any capability had been left behind.



Surprisingly, it was Maestro Carissimi who broke the silence. "Meister Schütz, you say? But I know this man. Oh, do not mistake me," he hurried on, as the others looked at him. "We have sent letters only. He came to Venice some years ago and spent time with Maestro Monteverdi, who was kind enough to give him my name. He sent letters asking questions, I responded, but never we did meet. A gracious man, a gifted man, but so lonely in Dresden he was, with no one sharing his vision."

An idea flared in Franz's mind like a star shell bursting in the night sky. "Josef! Rudolf! You are from Hannover. Could you make your way to Copenhagen?"

The two brothers looked at each other. Rudolf shrugged. They looked back to Franz. Josef said, "We have never been there, but in Hannover or in Hamburg are plenty of men who have. No doubt we could find our way."

Franz spun to face the Italian. "Maestro, could you write a letter to Herr Schütz, inviting him and anyone else in his company to visit Magdeburg?"

"Si."

Franz felt a very large smile spreading across his face. "Josef, Rudolf, you will take the maestro's letter to Copenhagen."

"But what of Stuttgart?"

"It is not far from Mainz to Stuttgart; we will go to Stuttgart after we visit Mainz, which will free you to go north. So, while the maestro writes his letter, you shall write one for us to carry to introduce us to your cousin."

Franz saw a bemused expression on Lady Beth's face as she handed pens and paper to various hands. He chuckled a little. "Frau Haygood, we will take our leave soon and let your domain resume its calm."

"Oh, that's okay, Franz. This is a school, after all . . . turmoil happens frequently. I just didn't expect you to find a solution so quickly, is all."

Marla laughed. "Best get used to it if you're going to work with us much, Lady Beth. These guys don't let grass grow under their feet much."

While the others were writing, Lady Beth beckoned. Franz, Marla, Isaac and Hermann grouped in front of her desk. She handed envelopes to Marla. "There are some vouchers for you to stop at the bank and get some traveling funds. There's also some authorization letters from the Abrabanel's that will let you draw on any of their associates if there are any emergencies. Keep track of how much you spend, and be sure that both Mary and I will review the expenses."

Her no-nonsense tone sobered everyone immediately. Marla said, "Yes, ma'am."

Franz looked around. Josef and Rudolf were done with their letter, but the maestro was still writing. A thought occurred to him, and he turned back to Lady Beth. "Ah, Frau Haygood, Johannes Fichtold will probably be traveling to Füssen soon, on business for Frau Simpson."

Lady Beth's raised hand stopped him before he could continue. "Masters Zenti and Riebeck have already been to see me. It's all arranged." She smiled at Franz's surprise. "I don't let the grass grow under my feet, either."

Maestro Carissimi straightened. "It is completed." He handed the letter to Josef. "Another thought occurs to me. If we need musicians, perhaps I should send letters to the Jesuit *collegia* north of the Alps. My name might capture some interest."

"Please do, Maestro," Franz said. "At this point, I think we might even accept an Englishman, if he could play well." As Marla passed out the

envelopes, he said to them all, "Well, my friends, we must be off. Take great care, and in no event be back to Magdeburg later than April 1."

"Last ones back buy a round at The Green Horse," Hermann called out. They trooped out the door in laughter.

Grantville Late January, 1634

"Well," Thomas started, studying yet another list, "Frau Matowski . . ."

"Just call her Bitty," Marcus Wendell said. "That's what everyone calls her."

"Very well . . . Frau Bitty, then . . . has an ambitious turn of mind, has she not?"

Marcus chuckled. Lady Beth Haygood snorted. "That's our Bitty."

"Oh, come now, Lady Beth," Marcus said. "I'll grant you she's a perfectionist when it comes to the dancing, but aside from that, she's just fine."

"Uh-huh . . . except that right now she's eating, drinking, breathing and sleeping dance. Between convincing Mary that *Swan Lake's* not in the cards for 1634 and trying to review every ballet program she has recorded or has ever done or even has notes on so she can cobble some kind of program together, her nerves are worn down so far she's on her last one, and heaven help whoever gets on it."

Marcus grinned. "Speaking of Mary, how did Bitty take the news that you're in charge right now?"

"All things considered, I guess okay," Lady Beth said. "Mary met with both of us, and laid out the ground rules, which didn't take very long. Then she left, and Bitty and I came to an understanding." There was a hint of a grin on her face. "I also told her she'd best be careful about who's around when she refers to Mary as 'Her Ladyship' in that tone she gets."

Marcus looked at her. "There are those who would take offense?"

"Mary definitely has supporters here in Grantville now."

"What kind of trouble could they cause? Could they cut off her funding?"

"Well, I doubt that Mary would be that petty," Lady Beth said, "particularly since she does want the ballet to succeed. But no doubt someone like Laurie Haggerty would try to make trouble."

"Her." Marcus made a face. "She and I had a whole series of 'discussions' about my lack of perception when I didn't make her son Duane the first part first chair horn player in the junior high band. She couldn't believe that I would let little things like whether he practiced or not—not to mention his attitude—outweigh his 'obvious superior talent,' and she didn't

have any trouble telling me about it—several times. Yeah, I'd believe most anything you'd tell me about her. But what's Bitty got to worry about with her?"

"Well, apparently they really locked horns during the rehearsals for *Nutcracker*, to the point that Bitty was muttering about the 'Ballet Mother from Hell.' Problem is, Laurie somehow managed to get an introduction to Mary, and made a slightly favorable impression. So, if I ever decide to leave, Laurie's name just might be on the short list to take over the arts management for Mary in Grantville."

"You're kidding!" Marcus looked aghast. "Aren't you?"

"Nope."

"I hope Mary's got more sense than that." Marcus turned back to Thomas. "Enough about Laurie Haggerty. Let's talk about something important. That's a pretty long list Bitty worked out with me for the ballet."

"That it is," Thomas agreed fervently, as he examined his copy of Bitty's list.



"The bad news is that she doesn't want just straight transcriptions on some of them . . . she wants some arranging done. The good news is the only things you should have to transcribe from recordings are *Intermezzo*, *Lemminkäinen's Return*, *The Swan of Tuonela*, and the first half of *Lemminkäinen in Tuonela*, all by Sibelius. A lot of it is already available to us in sheet music form." In response to Thomas' raised eyebrows, Marcus continued, "I kept all my college text books, including the study scores we

used in music history, form and analysis, and orchestration. Because of that, I have miniature full conductor's scores for Borodin's *Polovtsian Dances* and *In the Steppes of Central Asia*, Offenbach's *Orpheus in the Underworld*, and the Ravel transcription for Mussorgsky's *Pictures at an Exhibition*, which contains the *Promenade* and *The Great Gate of Kiev* that she wants to use. They just need to be copied out in full size.

"Then for the *Light Cavalry Overture* by Suppé and *Finlandia* by Sibelius, the high school music library has transcriptions of those for band. That means we've already got the music, we just need to reverse-engineer the transcribing to take it back to the original orchestration. A couple of my sharper band kids could probably do that."

He looked to Lady Beth. "That is, if Mary's funds will extend to paying them to do it. In fact, they could be a big help in general, even for the stuff that Thomas is doing for Franz, because they could take the full scores he produces and write out the original parts for the players, maybe even copy duplicate scores."

"Sure," Lady Beth said. "I don't see why not. But since they're not doing work at the same level as Thomas, I'm not going to pay them what he's getting, either."

"Sure. That's fair." Marcus stopped, deep in thought for a moment. His eyebrows raised. "You know, it just dawned on me that for this music to be possible this year, she's going to have to raid the band for wind players, and maybe percussionists, too. If she does, those kids are going to have to be paid, and I will expect them to be paid something approaching a union scale."

Lady Beth made some notes. "How many?"

Marcus counted on his fingers for a moment. "Probably about twenty, plus or minus."

She looked at Thomas. "And how many string players was Franz hoping to recruit?"

"He said he would settle for forty-five, but he wants sixty."

Lady Beth made some more notes. She set her pen down, and looked up with a serious expression. "I'd best get a message off to Mary. That amounts to more than she planned on, especially since Johannes Fichtold left several days ago for Füssen to dicker up some violin contracts."

Marcus shrugged. "Well, it may not be that bad. Bitty said one of her kids knew someone who still had their computer, with some kind of

software that might allow them to take recordings and massage them into a soundtrack for her purposes, and then dump it to cassette tapes. If that's true, then she can do it with recorded music, which would be cheaper and a whole lot easier."

"I don't know." Lady Beth shook her head. "Mary was dead set on a live orchestra."

"Well, no reason to bring it up until we know if it can be done. It does mean, though . . ." Marcus turned to Thomas again, ". . . that those four Sibelius pieces can go to the bottom of your list." He grinned at Thomas' sigh of relief. "I almost hope they can't make the recording, though. Those pieces as the backdrop for Bitty's ballet would be an outstanding concert in its own right. I'd like to hear that, wouldn't you?"

"I might get to," Lady Beth said. Both men looked at her. "Jere's been wanting me to move to Magdeburg, but I didn't want to take the kids out of school here. Well, someone's working on the idea of starting a school for girls in Magdeburg, and it looks like they want me to head it up."

Marcus whistled. "That's going to leave a hole in things here."

"Maybe so. But if I decide to go, they'll deal with it, just like they've dealt with all the other changes. I'm probably going to be traveling to Magdeburg in a few weeks to look things over and talk to people before I make up my mind. If I decide to take it, I'll be gone by the end of March, probably."

"So who will take over as *Frau* Simpson's voice and hand?" Thomas asked.

Lady Beth made another note. "I don't know. That's something else that will have to be worked out."

Thuringia - Late January, 1634

Isaac touched Klaus on the shoulder. "Stop here." He climbed down from the wagon and caught his bag when Hermann tossed it to him. He looked up as Reuel drew the second wagon to a stop near by. "Just wait for me here, please." Isaac waved at the nearby tavern. "It is no Green Horse, but it will do while you wait. This should not take long. I will be back in time for us to make it to Neustadt before dark." As the others began to dismount, he turned and walked down the streets of Aschenhausen.

The trip from Grantville had so far been uneventful. Klaus and Reuel had somehow arranged for courier duty to the Committees of Correspondence in Mainz and Stuttgart. As it turned out, they were both reasonably competent at driving wagons, which was a good thing, as that was a skill that none of the musicians had managed to pick up.

They had made their way through Halle, Jena, Weimar, Erfurt, Arnstadt, Wechmar, Gotha and Eisenach, as well as various small villages. At every stop they let it be known that a new orchestra was beginning in Magdeburg; one that would be the grandest orchestra in the world; one that would play the grandest music in the world. They mentioned that anyone interested needed to be in Magdeburg by 1 April, and they hinted that silver was in the offing. No one had yet jumped up and run out the door to scurry up the road, but Franz was satisfied that the word was being spread.

Now they were in Aschenhausen, and Isaac was walking down the streets he had run through as a child. When he was growing up, he had felt a pride when he looked at Aschenhausen. The houses of the important men of the town had seemed so large, so fancy with their carvings here and there and their painted doors. And the tavern had seemed so grand, had seemed to bustle all the time. Even after he had . . . left . . . his memories had still made Aschenhausen somehow seem special.

But now . . . now Isaac was walking those same streets with his stomach churning, almost six years later, having been in the wide world and seen Mainz, and Magdeburg, and even Grantville, the famous and infamous. He wondered if Aschenhausen's streets had always been this narrow, and if the houses had always been so small, and if everything had always been so . . . dingy.

He took a turn, leaving the main street—such as it was—and moved down a series of narrowing streets and alleys, until he finally stopped before a worn, unpainted door. He stood for a long time, hesitating, uncertain as to what he should do. His mind was whirling, his stomach was trying to climb up his throat. Finally, he slowly raised his hand and knocked. Shuffling steps could be heard, and the door opened to reveal an older man, stooped and gray-bearded. Knowing full well who he addressed, Isaac said, "I am seeking HerrJoachim Arst, the merchant. Are you he?"

The old man blinked. "Aye, that I am. And who might you be, young sir?" For answer, Isaac pulled one of the packages of coffee beans from his bag and handed it to him. Peering near-sightedly at the lead seal on the drawstrings of the package, the old man suddenly looked up sharply, grasped Isaac by the arm and swiftly drew him into the shop.

Holding up the package, old Joachim said, "This says you come from DonFrancisco Nasi. Truth?"

"Yes, Joachim ben Eleazar. I do indeed come from that man." Isaac dug the other two packages of beans from his bag, and handed them over. The old man turned to set them on the counter of his shop, and turned back to Isaac.

"So, you are one of us. Good. I was not sure, since you wear neither the *talit* nor the Jew's badge." He flicked his own tassels and looked faintly disapproving, which melded into a calculating stare. "I do not think we have met, but I think I should know you." Before Isaac could respond, the old man's eyes opened wide. "It cannot be! You! Here . . ."

Isaac smiled at Joachim's surprise. "Yes, Reb Joachim. Yitzhak the stranger stands before you." It struck him that his nervousness had dissipated, once he had committed himself to action.

It was some moments before Joachim recovered his composure enough to speak. "Why have you come here? After so long?"

"It is not my doing, RebJoachim. I do in truth serve DonFrancisco, or rather, RebPinchas in this, and he it was who directed my steps here. I am . . . not sure of his motives, only that he has them."

Joachim snorted. "You may be certain not only that he has motives, but multiples of motives. That one has a mind so twisty that a serpent could tie itself in a knot trying to follow his thoughts." His expression was wry, but the tone of his voice was admiring. "So, for some reason he saw some advantage to sending you to the shop of the poorest merchant in

Aschenhausen . . . besides bringing me a gift of coffee beans that could have been sent by any number of ways."

They stood silently for a moment, then Joachim pursed his lips and blew a burst of air. He looked up. "You have grown, young Yitzhak. Is it well with you?"

"It . . . is well, now. It was not well . . . when I left. I wandered, sore of spirit and aching of heart, and eventually ended up in Mainz, where I did indeed find the music that God put in me to desire, and I did indeed learn to play it. I found friends. But after what was said to me here, I . . . abandoned all outward sign of our people. I . . . could not bring myself to approach a congregation. And so it was until I moved to Grantville last year."

"Grantville, is it?" Joachim's eyes opened wide again. "So, you have seen that place, have you?"

"Yes, Reb Joachim. I have seen Grantville, and Magdeburg as well. And seeing Grantville, my sense of wonder awoke again, and I reasoned that if the Holy One, blessed be He, could work the miracle of that place, then perhaps He could somehow work another . . . the return of one from an exile which, if shorter than that of Babylon, was no less bitter."

"And did such happen?"

"Aye. I dared pass the doors of the Sephardic congregation in Grantville, and found that which proved to be the very balm of Gilead for my hurtful soul." As a hint of confusion passed over Joachim's face, Isaac was forcefully reminded that that passage from Jeremiah was not one that was commonly read in the synagogues. "And no less than Reb Pinchas told me with his own lips that I was welcome with the Sephardim of Grantville and Magdeburg, not just as a visitor, but as a member."



"Good." A smile appeared amidst the gray beard, and Joachim's eyes almost disappeared in the wrinkles of his face. "That is good to hear, and an answer to prayer." To Isaac's querying look, he responded, "Each day as I read the *Amidah*, I would also ask in my heart that The Lord of the World would remember you, keep his hand upon you, and draw you back to His chosen people. Blessed be He who gathers in the exiles."

"Amen." Isaac felt the familiar response come to his lips.

Just as the old man opened his mouth to speak, the door to his shop flew open, and a young woman, hardly more than a girl, whirled in and shut the door behind her, calling out, "Reb Joachim, Reb Joachim, Mama said for you to . . ." She stopped suddenly, obviously at the sight of the strange man standing in the shop.

Isaac was facing away from the door when it opened, and he stiffened at the sound of the voice. Joachim laid a hand on his arm, and he could feel the tension in the old man.

"Softly, Devorah, softly. You would not want our visitor to think we are uncultured."

"No, Reb Joachim. Sorry, Reb Joachim."

"That is better. Now, I dare say that your mother wants the sewing needles she asked me to get her, *nu*?" The girl bobbed her head. The old

man shuffled behind the counter, searched for a moment, and placed a packet on the countertop. "Here they are." Devorah reached out, and a moment later the packet had disappeared into a pocket. She started to turn and leave, but was stopped by Joachim. "Devorah, give a good day to Yitzhak ben Levi, from Magdeburg, who brought me some of the fabulous coffee that we have been hearing so much about." Isaac schooled his expression to calm, and turned to face her.

Her eyes widened. She dipped her head as she said, "Good day to you, Reb Yitzhak."

"And this is Devorah bat Shlomo, Reb Yitzhak, the eldest daughter of our rabbi."

Isaac gave a very slight bow. "And a good day to you, Devorah. I have heard good things of your family."

She began to blush, and dipped her head again. Uttering a strangled sounding "Goodbye," she bolted from the store.

Isaac turned on Joachim, and hissed, "What are you thinking? How could you do that to her, to me?"

"Calm yourself, young man." Joachim raised a hand. "It has been almost six years. You are a hand taller and at least two stone heavier. She should not recognize you, but you recognized her, did you not?"

In Isaac's mind, the face of the young woman was set beside the face of the girl that had been in his memories for so long, and he felt wonder and joy at how she had grown, and become a beauty. "Yes . . . yes, I did." A moment later, "Thank you."

"They are well, all of them, even the rabbi, although he is changed." At Isaac's look of alarm, Joachim hurriedly said, "No, no, nothing is wrong. But after a . . . certain event . . . our rabbi was long cast down in his spirit. Eventually, however, his remaining children gave him ease, and he again found some joy in life. But we all noted, we who remembered . . . before, that he is a somewhat calmer man, now, less harsh, slower to judge."

Isaac swallowed, then swallowed again. "Those are good words to hear. I wish him only the best in life."

"From your mouth to His ear."

After a moment, Isaac asked in a harsh voice, "Why did you name me ben Levi? I am fatherless."

"Well, it is true that your birth father no longer acknowledges you. However, is not your bloodline descended from Levi through both your

mother and father?" Joachim looked to Isaac, who was forced to acknowledge that truth. "Then you are a son of Levi just as much as Moses and Aaron. You can in truth be named Yitzhak ben Levi, can you not?" Isaac stared at him for a moment, feeling a knot in his chest begin to loosen, and then he felt a wide smile spread across his face.

The two men stood smiling at each other what seemed like an hour to Isaac. Finally, he sobered, and asked, "Are they in need for anything?"

"They are not destitute, but neither are they quite comfortable."

""Who is the president of the community now?"

Joachim smiled wryly again, and said, "As it happens, I am."

Isaac dug in his pocket, and pulled out a pouch, which he placed on the counter. "See to their needs, please." As Joachim opened his mouth to object, Isaac raised his hand. "Please. As I am not of that family any longer, this is part of my *tzedakah*."

"Is this works in secret, then, or may I tell the congregation so that prayers may be offered for your travels?"

"Secret," Isaac said. "Do not tell them where it came from." The old man nodded. "Send word if more is needed. For now, send it to Reb Pinchas, Don Francisco. I will get word to you somehow of where I eventually end up."

"It is good." Joachim set the pouch on the counter. After a moment, he looked up at Isaac, and asked gently, "Will you not go to him? Will you not try to reconcile?"

Isaac flinched. "How can I?" He threw his hat on the counter and ran his fingers through his hair, yanking at it as if he wanted to pull it out. "I am not just *herem*, shunned—he named me dead! How can I go to him?" The pain in his heart was so sharp he felt as if he had been stabbed. "He said *Kaddish*, did he not? No, no one told me, but I know he did. He even sat *Shiva* for me, I wager. He would not be the man he is if he had not performed the full mourning ritual." Joachim said nothing, but Isaac could see the confirmation on his face. "How can I face that? How can I appear before my mother and sisters and brother, only to be turned away? How can I hurt everyone like that?" Slower, softer, he said, "I could not bear it, RebJoachim, to be turned away again. I am sorry that they grieve, but the wound he dealt me is deep . . . so deep I despair of it ever fully healing . . . so deep, I cannot chance another."

The old man looked at him, sadness on his face. "It will be as you will it, Yitzhak." Isaac flinched again as Joachim quoted back to him the phrase he had said to his father that night years ago. "You do him an injustice, though, I believe. Rav Shlomo is not the man he was then."

Isaac shook his head, and said in a very low tone, "I cannot . . . please, I cannot." They stood together in silence for long moments. Finally, Isaac regained his composure and picked up his hat. "I must be on my way. I am traveling with others who wait for me, and we must travel many miles yet today."

"For Reb Pinchas?"

Isaac said nothing, feeling slightly dishonest about letting the old man draw mistaken conclusions. He felt so drained at the moment, however, that he could not bring himself to explain. He moved toward the door. Joachim stepped in front of him, and grasped his arms.

"The blessings of God Above, who held His hand over Avraham, Yitzhak and Yakov as they wandered in the wilderness, go with you, Yitzhak ben Levi."

Isaac was flooded with emotion as he considered everything this old man had done for him. "And with you, Joachim ben Eleazar. And with you."

Moments later Isaac was walking back up the streets of Aschenhausen, hands in pockets, feet automatically following the right path. At last the tavern came into sight, where Reuel stood outside adjusting harness on his wagon team. He called into the tavern. Moments later the others trooped out. While the rest of them climbed into the wagons, Marla came to him and peered into his eyes.

"Is everything all right?"

Isaac smiled gently. "Yes."

* * *

The door to Joachim's shop flew open. This time it admitted a short, stout woman who wore an apron over her dress and a cloth that contained her iron-gray hair. She was followed by the young woman who had come to the shop earlier. He was surprised—not that she appeared; he had been half-way expecting that ever since Devorah left—but that she was dressed so . . . informally.

"Good day, Rebitzin Rivka . . ."

"Where is my son?"

"Who?"

"Play no games with *me*, Joachim ben Eleazar." She advanced on him, eyes aflame. Joachim was very glad that the counter was between them. "I may be the rabbi's wife, and you may be the president of the congregation, but forty years ago I gave you a bloody nose and kicked your shins black and blue when you pushed me in a mud puddle. I will do it again here and now if you do not tell me the truth! *Where is my son?*"

"Gone." God Above, she was in a towering fury. Grown men had been known to pale on the rare occasions that her ire was stirred. Devorah was backed into a corner, wide-eyed. Unfortunately, he had no choice but to stand there and weather the storm.

"I see that, you old fool! Where has he gone?"

"I know not." That stopped her in mid-tirade. "He said he was traveling with others, and that they were leaving Aschenhausen immediately." Joachim watched as the fire of the strong-willed young woman he had known all those years ago guttered out, leaving behind the gray-haired, arthritic matron who was the wife of his rabbi.

"Leaving? But . . . why? Did he not . . . could he not . . ."

"He was traveling on business of someone important." Joachim had his doubts about whether it was Don Francisco, but he let Yitzhak's story stand.

Rivka visibly collected herself, and looked up at him with naked pain shining in her eyes. "Did he not come here to reconcile?"

"No."

She flinched. "Nevertheless, I should not have heard about him from Devorah. Why did you not bring him to us, Joachim? Could you not do that for him, for us?"

"I tried, Rivka." Joachim sighed. "I attempted that very thing."

Now her face whitened. "He will not reconcile? God Above knows that I love my husband dearly, but he is as stubborn as an angry ox, and Yitzhak is his father's son, in that much at least. Will he not at least attempt to reconcile?"

"I would judge, rather, that he cannot." Rivka obviously did not understand. Running his fingers through his white beard, Joachim said slowly, "I believe he loves his father dearly. For that reason, the words that were said that night hurt him very deeply. Now, like a wounded fox, he is curled around the pain and grief and cannot reach out. He is afraid that if he

tried, he would be rejected again. I tell you truly, if that happened, I would fear for his life."

Tears filled Rivka's eyes and spilled down her wrinkled cheeks. "All this time, we never heard from him, never heard about him. I was afraid he hated us, and would never return. And all this time he was bleeding from his soul, he was grieving. Oh, my son, my son!" She covered her face with her apron and sobbed brokenly. Her own grief and heartbreak caused Joachim to set aside the tradition that Jewish men would not touch another man's wife. He came around the counter and awkwardly patted her on the shoulder. Devorah stepped out of the corner and placed her arm around her mother's waist.

Finally the sobbing slowed, then stopped, except for the occasional snuffle. Rivka lowered her apron, exposing reddened eyes and nose. She dabbed at her face, then resolutely faced Joachim, who had retreated back around the counter again.

"So there can be no reconciliation?" Her voice was dead.

"I did not say that, Rivka," Joachim said gently. "I said that he could not begin it."

A light of hope dawned in her eyes. "You think if his father approached him . . ."

"A possibility only, but the only one I see." Joachim fingered his beard again. "But as you say, Rav Shlomo is somewhat . . . strong-willed."

The light of hope became a beacon of purpose.

"Yitzhak was born of this womb." Rivka laid her hands on her abdomen. Shifting them to her bosom, she said, "He nursed from these breasts. He is my son as much as he is his father's." She leaned over the counter, fiery gaze locked on Joachim's eyes. "*And I will have my first-born back!*"

Füssen - Early February, 1634



Johannes Fichtold watched as his brother Hans, having seen to wine being provided to all his guests, took a cup of his own and then came to stand beside him. "Let us not spend time in useless conversation," Hans said. That was so like his brother; if the talk was not about the crafting of lutes and viols, then it was time and effort that was misspent. "You all know that last summer the Italian, Master Girolamo Zenti, came through Füssen on his way north. He placed an order for woods to be delivered to him when he reached this Grantville that we have heard so much about. You also know that Johannes here," who almost staggered from the clap on the shoulder that Hans delivered, "went with him, to learn more of the Italian methods of

crafting while working in his service. I am sure that you all wonder why Johannes is back in town. That story is his to tell." And with that, Hans sat down.

Licking his lips, Johannes looked around the room at the men seated there: Matthias Gemunder, August Neuner, Ludwig Koehler, Christof Eichelberger. With the addition of his brother, Hans Fichtold, these were the senior *luthiers* and *geigenfabrikants* in Füssen. These were the craft masters of the guild. There were other families that made instruments, but the families headed by these men made the best, and everyone knew it. These were the men he must convince to make the instruments desired by *Frau Simpson* and Franz Sylwester. He straightened his cuffs and pulled down on his waistcoat. Remembering Master Zenti's instructions to stand tall and look confident, he straightened to his full height and did his best to assume that air.

Hans cleared his throat. Johannes, realizing he had been woolgathering, began his speech. "I know that all of you have heard of this Grantville. The rumors of its appearing in the countryside of Thuringia had long been floating here even at the time when Master Zenti and I were here last year, as Hans said. I am sure that you have discounted most of those rumors, as had Master Zenti and I before we arrived there. We were wrong to do so.

"Oh, to be sure, there are no angels walking the streets of Grantville, and those streets are not paved with cobblestones of gold. But the people of Grantville are possessed of mechanical arts so advanced that many times our best efforts seem like child's play. They have other wisdoms as well. You know they have allied with Gustav Adolf, and they are spreading out throughout Thuringia, having become a force even in Magdeburg.

"When we arrived, Master Zenti discovered, to his chagrin, that this was often true of music as well. His companion, Master Giacomo Carissimi—yes, that Carissimi." Johannes paused in response to raised eyebrows. The masters obviously recognized the name of the renowned Italian composer. "Master Carissimi told me that he will be years learning of all the changes in styles and forms, that it will perhaps be his life work simply to amass the knowledge.

"I have seen with my own eyes trumpets and horns that can play diatonic and chromatic tones in all registers. I have seen transverse flutes made of metal that are capable of incredible sonorities in the hands of a virtuoso. And I have seen an instrument called the piano that overshadows the harpsichord and clavichord as the Alps overshadow the hills that cling to their skirts. Master Zenti has dedicated his life to building pianos. I will stay

and learn of them with him, to return to Füssen at some point with that knowledge."

"If these Grantvillers are such paragons of artistry," interrupted Matthias Gemunder in a testy tone of voice, "then why are you here?"

"As it happens," Johannes said, glad of the question, "what they know of viols and stringed instruments in general is not far advanced over our knowledge and skills. Which is why I am here." He turned and picked up a leather case from the chair behind him. Extracting a paper, he handed it to August Neuner, the youngest of the men in the room. Unlike the other masters, he did not require spectacles to read. "Master Neuner, would you please read this missive aloud?"

Holding the page up in the best light, Master Neuner began.

*"Royal and Imperial Arts Council
of the United States of Europe
on this 10th day of January, 1634.*

"To whom it may concern:

"This is to signify that Johannes Fichtold is authorized to negotiate and sign binding contracts on behalf of the Royal and Imperial Arts Council with the Geigenfabrikant Guild of Füssen regarding the design, construction and delivering of instruments, including but not limited to violins, violas, violoncelli and contra-basses.

"This authorization will expire on the 30th day of April, 1634."

Master Neuner looked up and said, "It is signed by Lady Beth Haygood." He stumbled over the name. "With an additional title of Attorney-in-Fact, and is witnessed by Master Zenti and by a Master Hans Riebeck."

"Riebeck, Hans Riebeck," Master Koehler said. "I know that name. I thought he was in Mainz."

"He was," Johannes responded. "Last year he left his son in charge of their shop in Mainz, and brought his most talented journeyman and several apprentices to Grantville to learn of pianos and other innovations." That struck a note with the masters, he saw. It was one thing for an Italian, master or no, to chase after what might be a phantasm, but when one of their own hard-headed German brethren began pursuing the same goal, then they must take notice and examine the Grantville issue more closely.

"So," Master Eichelberger said, finally joining in the conversation, the last of the guild masters to do so. "At last we get to the heartwood. You are

here because they want something from us, these not-quite-angels of Grantville. Something that we can produce faster or for fewer ducats than they can. So, enlighten us, ambassador."

Johannes did his best to ignore the sarcasm in Master Eichelberger's voice. "Such is not only my intent, it is my charge. I said the Grantvillers were not far advanced over we down-timers . . ." He paused for a moment as a variety of confused expressions passed over the masters' faces, then realized what he had done. "Your pardon, masters, let me explain. Since the Grantvillers believe they were sent back from the future, they refer to themselves as up-timers, and to we native Germans and our neighbors as down-timers."

"And do they sneer when they do so?" Master Eichelberger's voice was sharp. "As if we are poor cousins, or beggars at the gates?"

"No." Johannes again managed to ignore the tone of the master. "Well, in truth, there are a few who do so, but I would say on the whole I have found them less arrogant than the Italians I dealt with when I first went south to study."

"Hmmp." Master Eichelberger sat back in his chair, only somewhat mollified. "That is not saying much." He said nothing more, and waved at Johannes to continue.

"Um . . ." Johannes tried to regain his thoughts. "Oh, yes . . . they are not far advanced over us in strings. Nonetheless, they do have advanced designs for viols. And, as Master Eichelberger has surmised, they desire instruments to be crafted for them according to those 'merino' designs." Too late, he remembered that Master Zenti had directed him to avoid the 'merino' label, judging that it would be confusing to the guild masters, perhaps even insulting if they made the connection to sheep. But in Grantville, the instrument crafters had all used that term almost exclusively when discussing the new designs. It had become second nature to him, so that it had just slipped out now. Johannes berated himself soundly, but was forced to drop the self-chastising when his brother, who had been silent so far to avoid any hint of collusion, spoke.

"'Merino'? Who is this 'Merino?'"

"Sounds Italian to me," Master Neuner said. "Did they steal it from an Italian master?"

Johannes thought furiously, and replied cautiously. "They never told me who this 'Merino' is or was, whether it was someone in their times or someone from our own." That much was true, he laughed to himself,

remembering when Friedrich had used the name as a joke, one that turned out to be self-perpetuating. "But they did reveal to me that many of the refinements and innovations in the 'Merino' designs were originally made by Italians." The masters of Füssen reacted in various ways to the thought of stealing a march on some unknown Italian masters: sly grins from some, a couple of knowing nods, but no further comments. Johannes engraved in his mind the thought that he must tell the others in Grantville to never reveal where the name came from. Finally, he returned to the original topic.

"I have convinced them that you can safely craft these instruments and transport them to Magdeburg, despite the . . . current state of affairs between Bavaria and the USE. And they want enough of them that it will take all of you to satisfy them." Johannes could see the masters glancing at each other, all of them—even his brother—with what Master Ingram called 'dollar signs' of avarice in their eyes.

"Before we get down to details," Master Gemunder said, "what is your percentage for brokering this deal? What will we have to pay you?"

"My compensation is provided by the arts council. As Master Neuner read to you all, I speak with their voice. There will be no additional fees for you to pay once we have settled on the prices for crafting the instruments and transporting them to Magdeburg." Again the masters looked at each other, this time in somewhat astonished disbelief.

"None?" Master Gemunder probed.

"None." Johannes was quite firm.

The looks shared now were somewhat skeptical. Johannes couldn't blame them. It was unheard of for a broker of any kind to not take a cut out of any deal in which he had a part, no matter how small. Nonetheless, his position had been made quite clear to him by Lady Beth Haygood: there was to be no profiteering in this venture, and if he tried it and was caught, he would be booted out of Grantville so hard his feet wouldn't touch earth again until he reached the Alps.

"So," ventured Master Neuner, "what is their commission?"



Finally, Johannes thought to himself. The introductory stage was finished, and now the really interesting part of the evening began. "The initial contract," he said, "is for thirty violins and matching bows to be crafted according to the 'Merino' designs, to be delivered to Magdeburg no later than the first of May. They must be of high enough quality that you would personally sign them. Their quality will be judged by a committee composed of Master Zenti, Master Riebeck, their leading journeymen and Franz Sylwester. Only those instruments which pass their scrutiny will be acceptable under the terms of the contract."

"Who is this Franz Sylwester?" asked Master Eichelberger snidely. "I do not know that name."

Johannes stared him down. "You may not know it now, but you will know it. All of Germany, no, all of Europe will know the name of Franz Sylwester. He will serve as the first *dirigent* of the world's finest orchestra."

"*Dirigent*? What is this?"

"It has to do with leading the orchestra in performance. I cannot explain it more than that. You will have to come to Magdeburg in July to see it."

"The contract," Master Neuner interjected. "Let us not forget the contract." He looked around at the others. "I dare say that we can produce that many violins in that time, provided that the designs are not radically different from what we already know." Heads nodded around the room. "So, the question becomes, what do they offer to us to set aside our other work, set aside our designs which are well-proven, and undertake their commission?"

"I am authorized to offer two Amsterdam guilders per violin to confirm the contract and provide for materials. An additional ten guilders will be paid upon delivery and acceptance of the instruments, for a total of twelve guilders per violin." There was a moment of silence as each man converted guilders to the Imperial currency. Eyes lit up, some in anger, some in interest, some just in the fun of the negotiation, but before any of the masters could speak, Johannes held his hand up. "And," he declared firmly, "each of you will also execute an agreement that you will not build instruments utilizing any of the 'Merino' improvements for anyone except the Royal and Imperial Arts Council for a period of six years."

The room exploded—at least it seemed that way to Johannes. Most of the masters were on their feet, gesturing and expostulating at the top of their lungs. The gist of their comments was that if the arts council wanted to rob them, wouldn't it be easier to just send Gustav's Finnish cavalry to sack the town? He did hear one muttered comment that by its tone was probably

highly vulgar, although he could not hear the words clearly. His brother sat back down, smiling slightly. Master Neuner had remained in his chair, viewing Johannes through narrowed eyes. Finally, all the others quieted and resumed their seats, albeit murmuring to each other.

Master Neuner cleared his throat. "Personally, for everything that this arts council is demanding, I could not see my way clear to accepting their commission for less than, say, 40 guilders. And I would not grant them more than a year of exclusivity." Heads nodded around the room.

Johannes remained standing to keep the advantage of looking down at them. He clasped his hands behind his back to keep from rubbing them together in anticipation. Accepting the challenge, he began the duel.

Grantville - Early February, 1634

Marcus Wendell turned the corner in the hallway and came face to face with Lady Beth Haygood. She was accompanied by a man he didn't recognize, which meant he was a down-timer.

"Lady Beth." Marcus came to a sudden stop. "Just who I wanted to see."

"Hey, Marcus." Lady Beth and her companion stopped as well. "What's up?"

"Just wanted to see if you've heard anything about Marla and her friends."

"Nothing. Where they were going and as long as they've been gone, they're well out of the range of the telegraph now. We probably won't hear anything about them until they're back."

"That's about what I figured," Marcus said. "Just thought I'd check."

Lady Beth smiled. "If I hear anything, I'll let you know." She reached out and placed her hand on her companion's shoulder. "Marcus, this is Max Ohl. He's going to be filling in for me in the office for a couple of weeks. Max, this is Marcus Wendell. He's the band director at the high school."

"Nice to meet you, Max."

"I am happy to meet you also." Max said, bobbing his head. He was a young man, Marcus saw as they shook hands, looking to be about the age of Marla and her friends. His English was strongly accented, but precise.

"So." Marcus turned back to Lady Beth. "Are you going to Magdeburg, then?"

"Yeah. I'm leaving next Monday, be gone for two weeks. They really want me to take this school deal, so I'm going down to scope things out. If it looks decent at all, I'll take it. I want my family back together, and since we'd be starting a secondary school for girls, all the kids would have places in good schools. That was the main reason I held back from moving before."

"Well, travel safe, good luck, and let me know if you hear anything."

"I'll do that."

Aschenhausen - Early February, 1634

Joachim ben Eleazar accepted a cup of wine from Rebitzin Rivka. "Please, sit, RebJoachim." Rabbi Shlomo ben Moishe gestured at a chair. As he did so, the rabbi sat as well. His wife chose to stand, although there was a stool nearby.

As the guest, Joachim knew he was expected to sample the wine and compliment it. Best to get it over with, he thought to himself. Rabbi Shlomo's taste was . . . undiscerning, to be kind.

As he expected, it wasn't very good. Since he had become *parnas*, president, to the community, he had suffered from the rabbi's tastes more than once. He suppressed his wince and said, "As good a cup as I have ever had." He made a mental note, as he had in the past, to acquire a few bottles of better Jewish wines to gift to his rabbi.

After several minutes of conversation about topics and issues that the two leaders frequently talked about, the rabbi set his cup on a nearby table, and folded his hands across his middle. At last, Joachim thought, we arrive at the purpose for tonight.

"My wife tells me," Shlomo said slowly, "that you have spoken with one who was once part of our family."

"It is true, I have had speech with Yitzhak, Rav Shlomo," Joachim agreed. "He was on the business of Don Francisco Nasi, Pinchas ben Yudah of the Abrabanel family."

"He has taken service with them, then?"

"Mmm, no, I would say not. Rather, he is briefly associated with them to pursue a common purpose."

"Ah." Shlomo nodded, then hesitated for a moment as a look of hunger flashed across his face. "Is he . . . well?"

"Yes, he is mostly well," Joachim responded. "He has matured into a handsome young man, tall and straight. He favors you to some degree, but I see traces of your wife's father in his face as well." He paused for a moment, then continued with, "My contacts tell me. . . ." The rabbi well knew who his contacts included. ". . . that he is known as Isaac Fremdling among the *goyim*, and has attained some reputation as a musician."

Rabbi Shlomo absorbed the double hit. First, that his son had named himself 'Stranger' to the rest of the world, and second, that music was still

such a part of his life. It was the rabbi's objection to his son's passion for music that was the root cause of their estrangement. Joachim saw his face freeze. Nothing was said for a long moment. Finally, the rabbi cleared his throat. "I am not surprised by that." He stared at his hands for another long moment, then looked up at Joachim. "Tell me."

Joachim recounted everything that had passed between him and Yitzhak in their meeting several days ago. He included his perceptions of the young man's state of mind. The rabbi drank it all in, fingering his beard all the while. He turned pale when Joachim repeated the metaphor of the wounded fox which had touched his earlier conversation with Rivka. When the telling was completed, Rabbi Shlomo stared at the opposite wall, a very distant expression on his face, pain in his eyes.

Time passed. At last, Joachim spoke again. "RavShlomo, with all respect, you were wrong in how you handled the situation with your son. It is the nature of young men to be passionate about some things. It is also the nature of young men to sometimes be disobedient. And although the Proverbs of Solomon say to spare not the rod in disciplining the children, it says nothing about wounding them unto death.

"I was there that evening. I recall it well. I recall the president of our community, old Benyamin ben Yohannon, and myself and the other elders pleading with you to not say those words, to find some way to not cast him out so finally. You would not listen to us, and so your first-born has been sundered from your family for over five years. Five years of grief for you and Rivka, and Devorah and Rachel and Reuven. Five years of pain and exile for Yitzhak. Old Benyamin would not challenge you further, so we, the community, supported you through saying *Kaddish* and sitting *Shiva*."

Joachim stopped, and directed a stern look at his rabbi. "But now I, Joachim ben Eleazar, president of our community, I say to you *enough*. Yitzhak has not stayed away because of anger or hatred. He has stayed away because he was wounded to the heart, and so deep and so wide is that wound he cannot find his way over or around it. He must be helped to reconcile, and that help must come from you. As Torah says, 'compassionate and gracious, slow to anger, abounding in kindness.' No other can reach him."

Rabbi Shlomo took that all in, unflinching, staring at Joachim. After the speech finished, he turned his head and looked at his wife for a long

moment. She might well have been a statue, so still did she stand, so rigid was her face. Facing forward again, he sighed. "I must think on this."

Mainz—February, 1634

"You will come, Georg?" Franz was delighted. Their quest for instrumentalists had so far not produced many musicians who were willing to move to Magdeburg.

After going to Aschenhausen so Isaac could fulfill his charge from *Don Francisco*, the group had decided to change their itinerary, reversing the order of the cities they would visit. From Aschenhausen, it actually made more sense to proceed directly to Stuttgart, then proceed to Mainz, and finally return to Magdeburg via Grantville.

They had made good time. The horses had remained healthy, and they had only suffered two broken wheels so far.

The stay in Stuttgart had begun well. The letter from the Tuchman brothers had been delivered to their cousin, who was able to provide introductions to many of the musicians in the town. They were well-received, and had demonstrated some of the new music with some of the new instruments, such as Marla's flute and a violin that Ingram had purchased out of Grantville's attics, but no one was willing to commit to coming to Magdeburg, particularly on such short notice.

Slightly disheartened, they had driven up the road to Mainz, counting on making contact with the musicians who had been there when Franz and the others had left. To their dismay, when they did arrive, they found that Isaac's estimate of twelve to fifteen possible recruits was a serious overestimate. Three of the musicians they were counting on had died in the months that had passed since Isaac and the others had left Mainz to travel to Grantville at Franz's invitation. Another had suffered a career ending injury, and three more had left Mainz looking for better circumstances. As they had not been in Stuttgart, Franz only hoped that word of the invitation to Magdeburg somehow found its way to them.

Five of the musicians who had been part of the Prince-Bishop's orchestra when Franz had left were still in Mainz—six, if you counted Rupert Heydrich. Franz tried to forget about him. He was experiencing a recurrence of the nightmares he had suffered after Heydrich had crippled his left hand to remove him as competition. So far their group had not encountered Heydrich, and no one they met mentioned him. Franz didn't

know their reasons for not doing so, but he appreciated their reticence nonetheless.



One of the five had given a definite "no." Since he was an old man now walking with a cane, Franz could understand why. Three of them had said they would think about it. That had left Georg Seiler. Franz really wanted to recruit him. Georg played the viola da gamba, the largest common member of the viol family, and the closest thing to a down-time version of the up-time bass. Having a feeling that the low strings were going to be the hardest to recruit, Franz had talked to him several times over the last few days, and finally tonight Georg had agreed.

"Yes, Franz, I said so, did I not?" Georg was blocky in size, with brown hair that constantly hung down over his face. The circles under his eyes proved that he had taken the death of his wife Mathilda of pneumonia during the days after Christmas very hard. "But only if I can ride back with you. I cannot afford to hire a wagon to cart my daughter and my instrument and my other things."

Franz looked over to where six-year old Odelia was showing her doll to Marla and Isaac. She was the very image of Georg's wife. Reuel stood by the door. "We have room, Georg." He looked around the bare room. "When can you leave? How much of this do you wish to bring with you?"

"Give me two days, Franz. I need the time to sell most of this worthless furniture and pay a few debts. I will want to bring Mathilda's bridal chest, and we will pack what few things we want to keep, like her dishes, in that. Other than that, our clothes and my viol are all we have that are worth bringing." Georg hung his head.

Franz leaned forward and placed his hand on Georg's shoulder. "Whatever you want to bring, we will find room for it. You are welcome with us, whatever your reason for coming." Franz squeezed his shoulder, then stood as a sign to the others that they should leave. "We will return tomorrow, to be what help we can." Georg just nodded his head, slumped in his chair.

After they tromped down the stairs of the rooming house and out into the street, Marla took his arm. "That's so sad."

"Indeed," Isaac said from her other side. "Mathilda was a lively woman, one who brought joy to all. And little Odelia bids to be much like her."

"I believe that is why Georg wants to move," Franz mused, "to remove them both from the place where Mathilda lived."

"Probably," from Marla.

"Aye," Isaac responded.

They walked in silence until they reached the inn where they were staying. As they entered, Marla said, "I need to go up to the room. Get me something to drink, and I'll be back down in a minute." Franz nodded. Reuel shadowed Marla to the stairs. Franz turned to the bar with Isaac.

He ordered a beer for himself, and a small cup of white wine for Marla. She preferred to drink no brewed or fermented liquids. Sometimes, however, there were no other choices, so she had learned to drink a little

wine since she couldn't stomach beer or ale. Just as they were delivered to his hands, he heard a voice from behind him.

"So. The rumors are correct. The prodigal has returned."

Franz's shoulders tightened, and his head pulled down instinctively. The last time he had heard that voice, it had been hissing in his ear moments after his left hand had been crushed during a brawl at a tavern here in Mainz. It was burned in his memory. It haunted his nightmares. It was the dividing line between his youth and the rest of his life.

Slowly, he turned. "Heydrich."

If Rupert Heydrich had not spoken, Franz would not have recognized him. Prior to Franz leaving Mainz, his memory of Heydrich was that of a slim, reasonably good-looking young man, somewhat vain, who always dressed well, made a fetish of cleanliness, and carried himself with an air. The figure that stood—wavered, rather—a few feet away bore no resemblance to his memories. The clothing was filthy; the shirt was smeared with soot, there was mud caked on both knees, the boots were scarred and worn, waistcoat and hat were missing. His hair was unkempt, his beard was scraggly. But his face was the worst . . . Franz had been gone for less than two years, and what had been a smooth youthful face looked now as if it belonged to a debaucher of the vilest kind. There were lines graven around the eyes and from nose to chin, seams under the cheekbones, and the bags under his eyes were dark enough to have been painted there.

"Are you surprised to see me, little Franz?" The voice was rougher, but the timbre was still the same, still enough to send shivers up his spine. The vitriol that dripped from it, however, was even worse than he remembered, if that was possible.

"Aye," said Franz. "I had hoped that you would have the decency to avoid me if you heard I was in Mainz."

"Oh, I could not avoid hearing that you had graced our fair city with your presence. There are those in our streets who, upon sighting you, could not wait to rush to my side and spill into my ears the news that, all unbidden and unheralded, you had returned.

"I waited, Franz . . . waited for you to come to me, to speak with your old friend Rupert, to renew old ties and friendships. But you never sought me out, and I am wounded to the heart." Heydrich theatrically placed one hand above the organ in question. Isaac stirred. Franz grabbed his shoulder, urging him back.

"I remember the last time we talked, Rupert. You seemed to have no use for me then."

"Oh, I was in my cups, Franz. Surely you can't hold that against me?"

Franz would have been stunned by the apparent arrogance, but he could see Heydrich's face clearly, and it was obvious that there was no truth in the man. He held his left hand up between them. "And was this done in your cups as well, Rupert?" There was no answer.

Franz continued. "I despaired of ever playing again, Rupert, to the extent that I attempted to smash my violin. I wandered away from Mainz, hoping that I would die." Heydrich smiled.

"And no doubt I would have, but God in His infinite mercy guided me to Grantville." Heydrich's smile slipped away into his beard like a worm into loam.

"Yes, Grantville, Rupert. I found that city, and amidst the reality of it I found wise men and women of the medical arts who could restore enough use of my hand that I could learn to play again. And I found music, Rupert, music from the future, music grander than any we had ever heard or played for the Prince-Bishop."

Franz felt his voice swelling, felt himself standing taller, staring directly into Heydrich's eyes. "I found a place there, a place that Archimedes himself would envy, a place to stand, where with my friends we will move the music of the world with the lever of Grantville and its archives."

Heydrich snorted. "You rave."

"Do I?" Franz turned slightly and unbuttoned his coat. As he shrugged it off, he saw Marla coming back down the stairs. Shoving the coat into Isaac's arms, he hissed, "Go to Marla. Keep her out of this!" Isaac turned away, and he turned back toward Heydrich.

Under his coat, Franz had slung the case containing his violin and bow to keep it warm. Now he set the case on the top of the bar, opened it, and took out them out. "I will play you a simple song," he said, testing the tuning of the violin, "for that is all I can play as yet. A simple song from Grantville, from the future, and you will understand, I think."

Nestling the violin under his chin, Franz raised the bow and began to play.

* * *

Isaac hurried to reach Marla just as she reached the bottom step. He grabbed her arm, and looked to Reuel. "Franz says we must keep her here." Reuel immediately grabbed her other arm.

"What are you doing?" Marla twisted in his grip. "Let me go! What's going on?"

"Shhh!" Isaac hissed at her. "Marla, that is Heydrich he faces! The man is drunk, or mad, or both, and is dangerous as a mad dog. You must stay here, let Franz face him. If you intrude you will distract him, which just might get him killed."

"Listen to him." Reuel surprised him by his support. "I am charged with your protection . . . I will not let you go there. Keep quiet, and your husband will probably survive. Start fighting or screaming, and he will die for certain." Marla turned white, gulped, and nodded.

Isaac turned to watch just as Franz began playing. It was one of the Irish songs, the one called variously "Londonderry Air", or "Derry Air", but most commonly "O Danny Boy." Isaac had sung it before, and the words reeled through his mind as Franz played.

*O Danny boy, the pipes, the pipes are calling
From glen to glen, and down the mountain side.
The summer's gone, and all the flowers are dying.
It's you must go, and I must bide.*

As Isaac sang the words of the song in his mind, Franz's violin sang the song without words, rich, sonorous, and somehow sad.

*But come ye back when summer's in the meadow,
Or when the valley's hushed and white with snow.
'Tis I'll be here in sunshine or in shadow.
O Danny boy, O Danny boy, I love you so.*

Franz sped the tempo a little in the chorus, lifting and swelling the sound as the lines rose and fell, slowing again in the last phrase. Isaac matched him move for move in his mind, thinking in a back corner of his mind that they needed to perform it this way some time.

And when you come, when all the flowers are dying,

*And I am dead, as dead I well may be,
You'll come and find the place where I am lying,
And kneel and say an 'Ave' thee for me.*

The second verse was so delicate, it was almost musical lace. Franz's touch was so light it belied his frequent insistence that he was still a fumbler, still only hacking at playing because he was not fully rehabilitated.

*And I shall hear, tho' soft you tread above me,
And all my dreams will warm and sweeter be,
If you'll not fail to tell me that you love me,
And I shall sleep in peace until you come to me.*

Again the sound swelled with the chorus, joyously, triumphantly, cresting in the third line. The tone was so pure, so sweet that chills surged up and down Isaac's spine. Closing his eyes, he abandoned himself to the music, as it began to ebb.

And I shall sleep in peace until you come to me.

Franz repeated the last line, slowly, softly, taking the final note up an octave and just seemed to hold it forever, letting it gently fade. As it disappeared, Isaac opened his eyes and looked to Marla. He was unsurprised to see tears on her cheeks.

* * *

Releasing the breath that he hadn't even realized he had been holding, Franz lowered his bow. He turned to the bar and set both violin and bow back in the case. Closing it, he pushed it toward the innkeeper, and motioned that he should set it behind the counter. The man nodded, and made an arrested motion with the cudgel in his hand, as if to offer it to Franz. Franz shook his head slightly and turned back to Heydrich.

"Rupert," Franz said. No reaction. "Rupert," he said louder. Heydrich started, and stared at him, wide-eyed. "Rupert, there is such music to be learned, such music to be played, that there is room for the two of us and many more. Can you not feel it? Can you not feel that tonight, perhaps tonight alone, we can make amends and enter this new world together?"

Heydrich said nothing.

Reaching back to the bar, Franz picked up the mug of beer he had ordered what seemed to be hours ago. "Come, Rupert," holding the mug out, "will you drink with me? Can we make amends?" There was silence for a long moment, then Heydrich's left hand snaked out and slapped the mug from Franz's grip. It bounced against the counter, and rolled across the floor.

"Make amends?" Heydrich spat. "Never! You have slandered me, making everyone think that I caused your injury. You belittled me, you took the praise that was my due, you were constantly stealing my place, you . . . you . . . It is all your fault!. And now you come, sneaking back to Mainz, seeking to steal my place again, bringing with you Jew Isaac and some slattern. Who is she, some down-on-her-luck whore who can find no one better than a cripple and a Jew?"

Rage flared through Franz. He felt as though every muscle in his body was clenching, as if he was swelling in size to contain his wrath. Somewhat of that must have shown, for Heydrich fell back a step or two.

"What lies between us, Rupert," Franz said in a voice so cold it could have been the winter wind blowing from the mountains of Sweden, "is between us alone. You will not say these things to my wife." As Heydrich's mouth opened, Franz raised his hand. "*You will not.*" His voice was no louder, but it was so hard it could have cut steel.

Heydrich was silent for a moment. "As you say, it is between us." His voice was shaking.

Franz lowered his hand, and when he spoke again, his voice was normal. "One last time, Rupert. I freely admit that I have wronged and hurt you in the past, just as you have wronged and hurt me." He held his hand out again. "Will you not take my hand and help heal this breach? Will you not make amends?"

For answer, Rupert spat at him

Filled with an unexpected sadness, Franz lowered his hand. "'Do unto others as you would have them do unto you.' By your own words and actions are you judged, Rupert. As you have rejected, so you are rejected. There will be no place for you in our world. Good-bye, Rupert. I shall not see you again."

Franz started to turn away. Out of the corner of his eye he saw Heydrich yank something from inside his coat. Heydrich yelled, "Turn not your back on me, wretch! I will have your life's blood for the insult!" The

next few moments were a blur. Franz could sense Heydrich lunging for him, no doubt with a knife in hand. He attempted to jump out of the way. Marla start to scream and the innkeeper began to bellow. His foot slipped in a puddle of beer on the floor from the mug that Heydrich had knocked from his hand earlier. Panic flashed through Franz's mind when he hit the floor—a flashback to the night Heydrich had crushed his hand. There was a loud thump behind him, and he rolled, cradling his hands between his chest and the counter, protecting them, expecting at any moment to feel Heydrich's boots crashing into him.

Nothing happened. The innkeeper stopped yelling. Marla stopped screaming. Then he could feel her at his side, pulling on him, saying, "Get up, get up! Are you hurt?" over and over again. He started to yell for Isaac and Reuel to come get her, to get her out of Heydrich's way, but a different sort of panic shot through him—Marla was in reach of Heydrich! He uncurled and shot to his feet instantly, looking around for his nemesis, and seeing . . . Reuel, bending over the huddled shape of a man on the floor. An unmoving shape. A shape wearing the coat that Heydrich wore.

Reuel stood, stuck his toe under a shoulder, and rolled Heydrich over. As his face appeared, Franz froze. Marla screamed again. Isaac said something that Franz didn't understand.

Heydrich would torment no one any more. As he would have done, so he was done to. Protruding from his right eye-socket was a knife hilt, blood seeping out around it.

"Never seen anything like it," the innkeeper said, shaking his head. "The drunken fool was holding that little knife ham-fisted, and when he slipped on the beer and threw his hands out to catch himself, he would not let go of the knife. His head came down right on the point of the blade." The innkeeper kept muttering, even as he sent a pot boy for the guard.

Fortunately, when the soldiers of the guard arrived, they accepted the witness of the innkeeper and those few patrons who had not slipped out the back door as to what had occurred. Once they found out Marla was from Grantville, their questions were few and perfunctory.

The sergeant pulled the knife from Rupert's eye, revealing a very narrow and thin blade. "An assassin's toy," he grunted, snapping it in two with little effort.

Waving his men on, the sergeant exited, and the corpse of what had once been one of the finest musicians in Mainz was dragged out the door as

if it were unwanted baggage. Other than the pot boy scrubbing the blood and beer from the floor, there was no physical evidence of the conflict that had just occurred.

Franz sat at a table. He was stunned, hands shaking, unable to speak, barely able to think. Marla sat to his left, both hands gripping his crippled hand, a worried expression on her face as she looked into his eyes. Isaac brought another beer from the bar and set it in front of Franz, but Franz was unable to grasp it.

Hermann had come down the stairs to find out what all the uproar was about, and had been demanding an explanation. Isaac finally sat him down and told him what had happened. "Good riddance to bad cess," was his verdict. Hermann sniffed. Then he went back up to the rooms.

Finally, Franz stirred. "That could have been me," he croaked from a mouth and throat dry enough to spit dust.

Marla brushed back his hair. "He never got close to you, dear heart."

"No. You don't understand." Franz was finally able to grab the mug and swallow a sip. Throat moistened, he continued, "*I could have been Heydrich!*"

Marla looked horrified. "What do you mean?"

Staring straight ahead, as if he were looking down a league of road, Franz said, "We were so much alike . . . in talent, in zeal, in passion, in goals. We were friends for a while, but then the competition to be best came between us. Neither of us could ever be happy that the other had done well, won some accolade, taken some prize. It poisoned our friendship, and we began to taunt, and goad, and bait each other. I was good at it, and more often than not, I won the battle of words.

"It was on a night of such a battle that he attacked me." He swallowed. "But I had dreamt of doing the same to him, of somehow causing the end of his career by some kind of injury. It was part of why I almost went mad, thinking that because I had been envisioning such things, God had visited them upon me."

"The Lord giveth, and the Lord taketh away, Blessed be the Name of the Lord," Isaac said quietly.

"And that verse, my friend, is what challenged me, kept me thinking, and walking, and living until I got to Grantville." Franz was quiet again for a long time, but seemed to have shrugged off the shock. He finally looked at Marla with a bit of a quirk to his mouth, almost a smile. "Do you know, it

was Heydrich that was responsible for our getting married?" Now Marla looked shocked. "Truly. If he had not done this to me . . ." Franz lifted his crippled hand. "I would never have gone to Grantville. I would never have met you that night. I would never have heard you sing, or play, or teach, or . . . anything." Franz paused. Then he spoke, softly. "God used Heydrich to humble my pride, and send me to you."

"Would you do it over again?" Marla quietly asked.

"To come to you?" His smile was blinding. "Oh, without hesitation, love. Without hesitation." She melted against him, holding his arm with two hands.

Silence.

"I wish he had taken my hand," Franz said. "I wish he had accepted my apology . . . I wish . . ."

More silence.

"Those who take up the sword," Franz said finally, as if pronouncing an epitaph, "by the sword will die."

Copenhagen - February, 1634

Josef watched as Heinrich Schütz, *Kappellmeister* to the court of John George, Elector of Saxony, finished reading the letter. He then started over at the beginning, and read it again. Johan assumed it said the same thing the second time as it did the first. Finally, Master Schütz set the letter down on top of the haphazard pile of music atop the table he sat behind, and looked for a long while at where the ceiling joined the wall on the far side of the chamber.



The *Kappellmeister* was an impressive figure, Johan had to admit. Heinrich Schütz was dressed in black with a broad white collar. He looked every inch the lawyer he had originally studied to be, before taking up music. His face was . . . striking, Josef decided. Schütz had gray hair swept back from his forehead, a prominent nose and strong chin. He looked to be

a friendly man, but Josef knew that to have survived as the major musician of the court at Dresden, there must be some steel in him.

Dropping his eyes back down to look first at Josef and then at his brother Rudolf, Schütz smiled slightly. "So, my friend Maestro Carissimi bids me come to visit him in Grantville. This letter, uncharacteristically short though it might be for one from *il maestro*, is undoubtedly from him. I recognize both the hand and his elegant turn of phrase. He waxes eloquent on the subject of the music and instruments found in Grantville; from the future, he says. Did I not know him to be one of the soberest men alive, I would say that he sounds as if he fell in a brandy tun, and did not climb out until after he had drunk most of it." He folded his fingers together, and rested his chin on his thumbs. "But, as I said, he is a most sober man, and one not given to exaggeration, so I must give some credence to his writing."

Schütz fell silent, and stared steadily at the Tuchman brothers. The weight of that gaze became heavy indeed. Josef bit his tongue to keep from babbling in front of the preeminent musician of Europe north of the Alps. He felt Rupert shift his weight, and knew that his brother was feeling it as well.

Finally, the master smiled. "Good. You are men of some substance. I like that." He sat back in his chair, crossed a leg across the other knee, and waved a hand. "Speak. Tell me of this Grantville of which I have heard so much, and why Maestro Carissimi speaks so highly of it."

Josef proceeded to do so, but all the while he was aware of that weighty gaze, as if he were a subject of a naturalist's study. He described the music they had studied with Marla Linder, the recordings that existed, the sheet music that they had seen, and the instruments—oh, the instruments! Josef considered himself a plain-spoken man, but he almost waxed lyrical as he tried to describe the brass and woodwind instruments from the future. Finally, he talked about the crowning glory of all they had seen, the piano. At last, Josef ran out of words, and stopped. He almost sighed in relief as that measuring consideration shifted to his brother.

"And you," Schütz asked Rudolf, "what do you have to say?"

Rudolf was silent for a long moment. Josef was about to jab him with an elbow, and sighed when he finally spoke.

"You are in their books, Master." Schütz sat bolt upright, eyes wide. "You lived quite a long life, and the books speak well of you." Schütz's mouth dropped open. "They call you the first great German composer, and

the Father of German music." A very far-away look came over Schütz's face. "And it occurs to me," Rudolf said softly, "to wonder just what music such a man would write with the tools of the future in his hands."

Josef was unable to see the vision that was before the master's eyes, but he knew it was there. He had to bite his lower lip very hard to keep from gaping at his brother. Periodically he had to remind himself that although Rupert was a man of few words, that did not mean he did not know how to use them, and most effectively, too. Tonight was one such time.

The master's gaze suddenly snapped back into focus, and he chuckled. "A story most well told, and not the least was the ending. But, outside of Maestro Carissimi's letter, what proof do you have that this is all true?"

Josef nodded to Rupert. It was Rupert who had insisted they needed something tangible in reserve, so to him went the honors of presenting it. Reaching inside a document case, Rupert withdrew a large music book and laid it in front of Schütz, who picked it up.

"Hmm . . . *Die Kunst der Fuge*, by Johann Sebastian Bach. I know of some Bachs in Thuringia. Competent musicians, as I understand. But who is this Johann Sebastian, and why did he write of the Art of Fugue? A pretentious title, I fear."

"Just look at it, Master. You will understand."

Schütz did just that. He began turning the pages over quickly, but as he progressed deeper into the book, he began slowing down, until he was spending a minute or more on each page, scrutinizing the music intently. Finally, he closed the book, once more staring at the junction of ceiling and wall across the room from him. At length, he lowered his eyes to the brothers, a very sober expression on his face.

"The Art of Fugue, indeed. And this came from the future?" He shook his head as Josef opened his mouth. "No, I do not doubt you. This . . . this *genius* is not in our time. It could not be hidden." Pulling at his goatee, Schütz brooded. He looked back at them. "No, no jest is this. So, the question is, what shall the response be?"

Grantville - Late February, 1634

"Lady Beth!" Marcus Wendell said as he encountered her outside the school building. "I didn't know you were back from Magdeburg."

"Hey, Marcus. Yeah, I got back last night."

"I'm surprised you're not at home, crashed and burning."

Lady Beth snorted. "I'm a little tougher than that, thank you very much."

"So, how was it . . . the trip, I mean?"

"Once I got to Magdeburg, it was good. I saw everything I wanted to see, and had a couple of really long talks with Mary Simpson. She gave me some good advice."

"And?"

"You're looking at the new administrator for the Duchess Elisabeth Sofie Secondary School for Girls." Lady Beth smiled.

"You took the job! Outstanding! Congratulations!" Marcus grabbed her hand and shook it enthusiastically. "So, when do you have to be there?"

"This school has to be created from scratch, so basically as soon as possible. I'm shooting to be in Magdeburg full time by the middle of March."

"Ouch! Sounds like you're going to be pretty busy."

"Yep. I've got to sell the furniture and most of our odds and ends, pack up everything we want to take with us, and hand over my jobs." Marcus' eyebrows rose. Lady Beth continued. "Max Ohl will take over my job at the Tech Center full time. He's really pretty sharp. If you have to do anything with him, you'll like him. I'll work with him another day or so, make sure he knows where all the bodies are buried and who to watch out for." She got a mischievous glint in her eyes. "And I got Mary to commit to a replacement for her arts program management stuff."

"Oh, please," Marcus groaned, "please tell me it's not that awful Haggerty woman!"

"Well, actually, her name did come up . . ." Marcus interrupted Lady Beth with a louder groan, ". . . but I managed to convince Mary that she really wasn't the best choice for that work."

"Thank you, thank you, *thank* you! All right, already, tell me who it is!"

"Amber Higham." Marcus' relief was almost tangible, and Lady Beth chuckled. "Yeah, I convinced Mary that Amber's theatre background would help her manage the personalities and the programs."

"That it would. Plus, she's good people."

"As good as they come."

Copenhagen - Late February, 1634

Josef knocked on the door, a little diffidently, Rudolf standing behind him. "Come in," he heard, so he opened the door and entered the room, Rudolf coming behind and closing the door. Master Schütz waved a hand at the chairs, not looking up from where he was reading through *Die Kunst Der Fuge* again. "Be seated, *Herren*, if you please." Josef and Rudolf pleased to sit immediately, and watched the master as he slowly turned the pages of the masterwork of a man who would never be.

Finally, Schütz closed it and set it aside on the table, which was clear of everything that had cluttered it the last time they had been in this chamber. He sat back in his chair, and laid his arms along the arms of the chair, gripping the knobs at the ends. His presence was austere dignified, almost regal, and Josef swallowed.



There was silence for some time. Schütz did not speak, and Josef and Rudolf could not bring themselves to break the master's silence. At last, Schütz focused on them, and said, "I have served the Elector of Saxony for almost half of my life—first as organist, then by his grace I was named *Kappellmeister*. I have written music, led performances and taught his students and musicians for all that time. And he has been a reasonably generous patron."

Josef began steeling himself for disappointment. This sounded as if Master Schütz was going to refuse them.

"He has been generous until recently, that is," Schütz continued dryly. "His recent . . . reversals . . . have forced him to adopt measures of economy."

Josef's heart began to rise, and he dared to say, "You mean . . ."

"Elector John George cannot pay my salary, nor that of my . . . his musicians." Josef felt a sense of elation at the frown on Schütz's face, only to have it collapse at his next words. "I have been offered a post here in the court of Crown Prince Christian, and I am certain that I would be allowed to hire my musicians." No question this time about whose musicians they really were.

Preparing himself to hear words of refusal from the master, Josef was instead startled to hear, "But . . ." Schütz said nothing more for several moments, then he picked up *Die Kunst Der Fuge* again for a moment, and said, "This has awakened a curiosity—nay, a hunger—in me that I cannot resist." A small smile appeared on the master's face. "I would come to Grantville to see the wonders of which Maestro Carissimi tells me, and to finally meet *il maestro* face to face. And then, perchance, to Magdeburg, to hear this concert you spoke of. How large an orchestra did you say you were trying to amass?"

Josef tried to speak and discovered his throat was almost paralyzed with surprise. He coughed hard, and managed to croak, "Franz Sylwester, our *dirigent*, wishes to have sixty string players, Master Schütz."

"So many . . ." A calculating look crossed the master's face, and then a smile of pleasure. "I have never heard so many. I look forward to it. And you may tell your leader that I will encourage my musicians to also come to Magdeburg." His smile widened to a grin with more than a hint of wicked humor in it. "After all, if Gustavus Adolphus has, ah, acquired dominion over the lands of the Elector, then it would be only fitting that he acquire the Elector's musicians as well, would it not?" Josef found himself nodding energetically, a smile on his face the equal of that on the master's.

Schütz lightly smacked his hands on the knobs at the end of his chair arms, and said, "Good! Now, I must stay here until the marriage celebrations of Crown Prince Christian and Princess Magdalene Sybille, the Elector's daughter, are completed, to ensure that the music is done as I specified. It took them some time to find a suitable date with no conflicting celebrations in the church calendar, but they finally decided, and the wedding will occur shortly on 2 March. We will all be required for various celebrations and

gatherings after that, but I anticipate that I will be able to slip away perhaps a week or so later."

"Umm," Josef asked, "am I correct that the courts of Denmark and Saxony still calculate dates using the Julian calendar?" He knew the answer; he was setting up a problem for the master.

"You are."

"Master, the Grantvillers calculate dates using the new calendar of Pope Gregory." Schütz's eyebrows rose. "So their dates are ten days ahead of yours. In the new calendar, the wedding will occur on 12 March. That leaves about three weeks for your musicians to travel to Magdeburg in order to be there for the beginning of rehearsals in the first week of April."

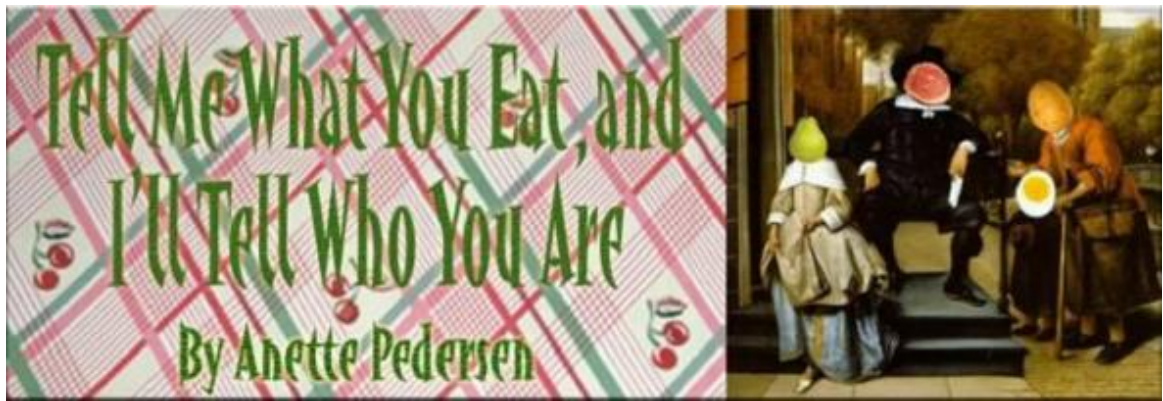
Schütz waved a hand. "I can change the schedules somewhat. My men will be there." He smiled. "They will not fail me, not after I tell them what they are going for."

* * *

To be continued

**Tell Me What You Eat, and I'll Tell
You Who You Are**

Written by Anette Pedersen



Food and Cooking According to Class in 1632

Introduction

In the Germany of 1632 the difference between the food available to the rich and to the poor was immensely bigger than it is today. Not so much because of the various class-based anti-luxury decrees aimed at cutting down on expensive imports—those were largely ignored—but because there were very few stores selling anything not locally grown or produced. Only those rich enough to arrange their own imports could usually supplement what they—or their neighbors—could grow and preserve for the winter.

This article is concerned with what was eaten by whom, when and why, but with the most attention to how the major part of the population lived. Anyone looking for descriptions of royal banquets and elaborate feasts can find those in library books about the Renaissance. The information in this article is presented in four sections concerning respectively: the householdless, the poor households, the middle-class households, and the upper-class households. In a final section there are some speculations on the changes caused by the arrival of the Americans.

The Householdless

Street-beggars were usually not allowed in German towns. A few of the more respectable poor—such as crippled soldiers and impoverished widows of local origin—were sometimes given permission from the council or parish to go from door to door—back-doors, of course—and beg leftovers from the kitchens. The major towns would have a poorhouse, while in smaller towns and in rural parishes those not able to fend for themselves would be housed and fed in a rotation system. Typically this worked as a part of the tithe (church tax) arrangement, and all major farms and households were assigned a certain number of days in the year in which they were to feed and house one or more of such non-working persons. The people thus housed were not limited to cripples and widows unable to find employment, but would include the old and the senile as well as those born with a physical or mental handicap. In fact, any disabled person that the rest of the society preferred to keep out of sight and forget about. These people, depending as they did on the generosity of others for their food, might do fairly well in times of plenty, but as the war created shortages, they were the first to suffer.

Somewhat better off than the non-working poor were the apprentices, farm-workers and the lower servants. These people, which together with the small farm households formed the major part of the population, would have little or no money of their own, and were almost completely in the power of their employers. It was, however, a major part of their wages that they had a place at the table of the household they served, and while the food at the lowest end of such a table would be coarse and dull, they rarely went hungry unless the entire area was starving. Also, while it wasn't possible for people in this group to marry and set up a household of their own, there were opportunities for advancement to journeyman, farm foreman or upper servant, and thus to a life with far better prospects for independence.

A third group too poor to afford an independent household were the day-laborers, poor students, non-famous artists, and others who would rent a single room with no way to prepare their own meals. Instead they would go to the cheapest taverns and ale houses twice a day and buy a bowl of soup or stew along with bread smeared with drippings (fat from roasting meat) and beer. These people had more freedom—and often more money—

than those mentioned above, but there was no kind of security to their livelihood, and the wages offered by the hiring armies often seemed an attractive alternative to starving. In most areas this group of poor independents would be quite small, but in the major towns—and especially those with a harbor or a university—there would be enough such persons to keep several very cheap eating places going. Including students in this group might seem odd, since only young men with a wealthy family or patron could afford to pay for the tuition at a university, but a father/patron willing to pay tuition did not necessarily mean a father/patron willing to pay for an expensive lifestyle. Contemporary journals and letters show that many university students did in fact rent an attic room and eat the cheapest meals for sale.

For soldiers and sailors the situation was somewhat different, as they would often have money, but rarely much freedom in planning their life and meals. The common soldiers and low-ranking officers could—and often did—have their family with them on campaigns as a kind of mobile household. The army the soldiers served in would be expected to provide the basic food items such as porridge grains, rye bread, beer and salted meat or fish as a part of the wages. These foods could either be eaten without cooking, or simply mixed in various ways and boiled over a campfire. From time to time there would also be opportunities to supplement this dull diet by plundering, trading or gathering other items. The sailors would normally have a home-port where they could keep a permanent base with a family supported by their wages. While on ship their diets would however be limited to what could easily be stored and transported, namely porridge grains, hardtack/ship's biscuit, beer, salted meat, dried and salted fish, sauerkraut, cheese, mustard and vinegar.

The Poor Households

In the smallest households, be they in the country or in towns, two questions really decided how poor you were. First: could you buy a piglet in spring, and let it roam to fatten for slaughtering in autumn? Second: was it possible for you to grow a few plants of your own on a small fenced plot? If the answer to both was yes, the household should do all right—unless the pig died or was stolen. If the answer to both was no, then chances were that everybody would get so weak and malnourished during the winter that any disease could kill them.

That having a pig to slaughter could literally mean life or death to a family seems unbelievable in modern terms, but a low-income household in 1632 would not have the cash to buy the 150-200 pounds of meat-products a pig was expected to provide. And as this was likely to be the only fat and the only animal protein available during the winter, its production and preservation was vital.

If you had a small plot—called a kailyard— of your own, the bought winter vegetables could be supplemented by fresh winter-hardy kale plus stored onions, roots, and garlic, thus adding not just variation, but also some sorely needed vitamins and minerals to the winter meals.

During the summer the danger of malnutrition—or outright starvation—was less for this class, partly because the prospects of earning a wage were bigger during the growth-season, partly because even the poorest family could supplement their meals by gathering wild plants such as young nettles, dandelions, wild onions, lovage, ground elder, and angelica.

Aside from salted pork and fresh kale, the winter food in a poor household was likely to consist of bought grain for porridge, a few of the cheapest vegetables, plus the coarsest bread from the baker and the cheapest small beer from the brewer. If any kind of spices were bought they would most likely be mustard and vinegar, but other flavorings would be limited to whatever herbs and berries could be gathered or grown.

Which vegetables were the cheapest would, of course, vary from area to area. Some food items such as beans, turnips/swedes, oats, and millet were considered too coarse to be digested by anyone but those doing the coarsest labor, and were thus found exclusively on the tables of the poor. Other items such as peas—and, in some areas, cabbage—were cheap to buy,

but eaten by everyone. The peas, by the way, would not be the fresh, green summer vegetables we think of today, but the hard yellow or green split-pea types, allowed to mature fully on the plants before being dried for storage.

Buying the rye as whole grain or flour to be baked to bread—and the barley as whole grain or crushed malt to be brewed to beer—would often be cheaper than buying the finished products, but making these items in a small house created other problems.

A small house in 1632 might be just a single room, and the kitchen might be nothing more than a hook over the fire to hang your clay pot on. This would serve to boil the grain porridge, pea soup or kale gruel that was the usual meal. To save firewood this would often be done only every other day. The leftovers would then be served cold the next day.

Without an oven it was possible to make a primitive dough of flour and young beer, and bake this to a kind of bread in a lidded pot placed on the embers after the main meal was cooked. It was also possible to bake clay wrapped items—such as roots—in the ashes, but real bread could be made only by paying a fee to use a big brick oven that belonged to somebody else. The fee wasn't fixed, so if that "somebody" was the local baker, there might not be anything saved compared with buying his cheapest bread.



Drinking beer instead of water was not a luxury, but something necessary in even the poorest household. There was no piped water available, and the buckets of water somebody from every household had to carry to the house would come from a common well or the village pond. The pond was also the place used for watering the animals. Even if the water was drawn from a closed well, the lack of sanitation made the water much too dangerous to drink. Once the water was used—for bathing, washing or housecleaning—the dirty water, along with any refuse (including human and animal urine and feces), would be thrown into the open gutter or onto the midden. All water—be it clean or dirty—runs down-

hill, so the filthy water and waste would eventually end up in the same location.

Making the simplest ale did not demand a lot of expensive equipment, but did require more space for trays and containers than might be available in a small house, and it required more firewood. So—as with the bread—it might be necessary to buy the lowest quality rather than make something better yourself.

A special problem in poor Catholic households were the many meatless days—often three days a week plus the weeks of Lent—where some kind of fish, shellfish or snails had to provide the needed protein. The cheapest option was to buy a barrel of salted herrings imported from the Baltic area, and a single barrel was expected to last a whole year in a small household. It was, however, to be paid for in cash. If that much cash wasn't available the fish either had to be bought in smaller portions at a higher price, or the household had to make do with bread, beer and vegetables.

Theoretically—based on religious instructions—there were only supposed to be two meals during the day: one around nine or ten in the morning and one around five or six in the evening. In reality, nine in the morning was much too long a wait for people who had often been working since dawn. Working people would therefore start the day with a breakfast around five o'clock in the morning, after feeding the animals on a farm, and before starting work in the town. The next meal—the largest in the day—would be served around noon or a little earlier, and finally there would be a smaller evening meal around sunset. In between these meals those doing hard manual work would have small snacks—usually a piece of rye bread and a glass of beer—if they could afford it.

Breakfast in a poor household would be cold to save firewood, and would most likely consist of beer with rye bread or cold porridge from the day before—and perhaps a herring straight from the barrel, just with the salt brushed off.

The warm meal in the middle of the day would most likely consist of grain, pulses or vegetables boiled to a gruel, soup or stew. If some salted meat was added, this would first be soaked a bit, and then boiled in the liquid forming the base of the meal. Rye bread and beer would also make up part of the meal.

The lighter meal in evening would most likely be a soup—perhaps made by diluting the leftovers from dinner. In any case, beer and bread were

certain to be included.

The meals in a small and poor household would be served by placing the food at the center of the table, and each person would then eat directly with a spoon from the common pot. In addition to the personal spoon—which would be licked clean after each meal and stuck somewhere until the next meal—each person would bring a personal knife and get a piece of bread. The bread could be used as a trencher in the Medieval fashion—that is: to place any firm parts of the meal on for cutting—but it could also be broken into bits and used to soak up liquids from the common pot, or it could be spread with fat or mustard and eaten during the meal. In the country this way of serving the meals would continue in the smaller households for several centuries after 1632, but in the towns the fashion for individual bowls or platters slowly spread down the social layers.

Beer would be served with all meals to all classes, but in the poor households there wouldn't necessarily be individual mugs to drink from. Instead a tankard would be passed around and each person drank in turn. Such tankards—and mugs—had to be covered to keep the flies out. In the poor households, where hinged metal lids would be too expensive, the cover would simply be a slice of dry bread—thus "drinking a toast" when you removed the bread to drink.

The Middle-class Households

In households where starvation or malnutrition were not just around the corner, the range of food products was quite a lot wider; in the towns because you could buy from the farmers and merchants, and in the country because the farm would be arranged to provide almost everything needed for the household.

As in the poor households, the most important meat products on a farm would come from the pigs. But there would also be oxen to slaughter once they grew to old to work as draft animals, as well as a few cows producing milk to be preserved as cheese and heavily-salted butter, some sheep or goats for wool, milk and meat, and poultry for meat, eggs, down and feathers. The pigs, however, were the only animals raised solely for their meat, and—to save the cost of feeding the animals during the winter—most pigs slaughtered in late autumn and the meat preserved in various ways.

On a fair-sized farm in central Germany you'd also expect to find a large vegetable garden in addition to the fields of grain, peas and swedes. In addition to the vegetables that were grown in the small household's kailyard, such a large garden would also contain head cabbage, leeks, spring turnips, carrots, parsnips, and beet-roots, as well as several herbs such as thyme, marjoram, dill, horseradish, and caraway. A row or two of fruit trees or grape vines would also be expected, and if the soil and climate were suitable this might have been expanded to a small arbor with the fruit grown as a cash crop.

In order to buy the few things the farm could not produce—such as salt and salted fish—at least a few cash-crops were needed. Aside from apples for cider, this could be grapes for wine, cabbage for sauerkraut, or flax for textiles, or—if the acorn production in the forest looked good—a few extra pigs might be fattened for sale. Especially in Catholic areas there could also be fish ponds for carp or pike, either on major farms or owned in common by a village. Many farms would also either sell any excess products at the weekly market in the nearest town, or have arrangements with one or more major town household for delivering meat, vegetables, eggs, butter, etc. The main purpose of the farm was, however, to supply the food for the household, and many of the more isolated farms had very little trading with the rest of the world.

In the town household of a well-to-do craftsman or merchant you'd find all the local farm products, as well as imported goods such as rice, chickpeas, wine, spices and sugar. A big household would most likely also have a few pigs in a sty behind the house, where they would be fed on the garbage and leftovers from the kitchen. A few chickens, and perhaps a cow for milk, were also quite normal, as was a pigeon coop for squabs.

In the larger fireplace of a middle-class household there would be other ways of cooking than boiling. At least some of the pots hanging from the kettle hook would be of metal, usually brass, suitable for braising meat, and the fire itself could be both logs supported on fire-dogs, and coals in iron-baskets. An iron grid placed over such a basket filled with glowing coal, was the fore-runner of the barbecue. An iron frying pan on legs, used the same way, allowed the option of fried and broiled food, in addition to the boiled dishes of the poor. Poaching delicate food such as fresh fish or dumplings was also possible by placing a small pot or pan filled with water over one of the smaller fires.



A large household might also have a baking oven of bricks and clay, either build into the kitchen wall or as a big hive-shaped structure outside. It would be fired only once a month or so, but in the weeks between the baking days the bread could be supplemented by various kinds of pan- and griddlecakes as well as deep-fried donuts-like fritters. There would, however, still be no access to clean water. Such a household would probably also brew its own beer—but that's another story (*The Daily Beer, Grantville Gazette, Volume VIII*).

Boiling was, of course, also done in the bigger households, and here—where the firewood wasn't limited—a large metal cauldron filled with water could be left to simmer for hours with various sealed pots and bundles tied

to its handles to keep them suspended in the water or steamed just above. The pots would be of clay with a lid glued on with a mix of flour and water, and could contain—for example—a rabbit stew or what would today be called a casserole. The bundles could contain vegetables or puddings of meat or dough, which would be tied or sewn into a cloth, and boiled or steamed in the manner still used in the UK and Holland.

The meals in a middle-class household tended to follow the same pattern as in the poor household, but with a bit more flavor and variation. The average breakfast would consist of a warm porridge of barley grains or rye bread boiled in beer, served along with beer and either a boiled or broiled herring or a slice of some kind of pork product. Warm beer—perhaps with an egg beaten into it—and a slice of fine bread with honey would be the luxury version of a breakfast, and would sometimes be served as a treat or to an invalid.

The big meal in the middle of the day would most likely include a kind of soup, gruel or stew, but it would be served with boiled, baked or fried meat or fish—and perhaps vegetable side-dishes as well. And in addition to the bread and beer, there would certainly be some kind of condiment like mustard or pickled beet-root.

The evening meal would most likely be a soup served with slices of bread spread with fat and a bit of cheese or sausage, but a treat in the shape of a pie or a dish of baked apples were also possible.

By 1632 some large households—in towns as well as country—still kept the old tradition, and had one set of common pots and platters at the low end of the table for the servants to eat from with their spoons, and another set—of more and more refined dishes—for the family and guests at the other end. However, in households too big for everybody to easily reach a common pot placed at the center of the table, it made sense to acquire individual bowls and platters. For this kind of serving the food would either be placed in large pots and on platters at the center of the table, and from here ladled or lifted to the individual bowls, or the housewife would remain away from the table and ladle the soup, porridge or stew into the individual bowls of clay or wood, which would then be brought to the table.

Regardless of whether the food was eaten from individual bowls or common pots, the drinking vessels in a large household would by 1632 most likely be individual, or at most shared between only a few persons. Such vessels would often be of clay or stoneware, but wood, metal, and

glass were also around. It all depended on the wealth of the household and, regardless of the material they were made from, most drinking vessels would have a metal lid to keep the flies out of the beer.

The Upper-class Households

On the major estates and in the households of those able to buy and import freely, the range of both stored and fresh products increased hugely. Aside from all the local farm-products, such households would also have access to venison, wild boar, hare and game birds, as well as the more exotic peacocks and turkeys. There would also be fresh fish and crayfish from the ponds, lakes and streams, and in the forcing-houses and cold-frames out-of-season and exotic vegetables and fruits would be grown for the family table—while the servants, of course, ate the ordinary food that was served in the classes below.

On the major estates slaughtering and the ensuing fresh meat was not limited to a single occasion in autumn, but happened whenever an occasion demanded it. Some cows would be fed well enough to stay in milk during the winter, and all kinds of poultry—including geese, ducks, pigeons, peacocks, and turkeys—would be kept for fresh meat and eggs.

In the vegetable garden of such households you'd find lettuce and asparagus, and the new cauliflower and broccoli from Italy would be grown along side cane-supported rows of garden peas. Cucumbers, melons and artichokes as well as basil and rosemary would be on their northernmost border in Germany, and had to be grown—or at least started as seedlings—in the forcing-houses. The heated glass-houses—for pineapples, etc.—so popular in Victorian times had not yet been developed, but brick buildings with large glass windows called orangeries were being build at the royal palaces to keep citrus trees and other Mediterranean plants alive during the winter.

To further vary the dishes served, items like saffron, dried peaches and apricots, almonds, lemons, olives, capers, pine nuts, dates, figs, and rice would be imported from the Mediterranean, while sugar and spices would be imported by the crates directly from the producers.

In 1632 the kitchen would most likely consist of a big central room surrounded by several smaller rooms, each with its own function. The central room would be the location of the big fireplace, several working tables, a large butcher's block for slicing and chopping meat, and a stand for the big granite mortar, as well as shelves and cupboards with all kinds of kitchen utensils along the walls.

A laundry, a brewery, and a dairy might be located either in connection with the kitchen or in separate building, but a bakery room or two—one for bread and one for sugar cooking—would certainly be found next to the main kitchen room.

The big bread oven would most likely be a separate structure in the court outside the kitchen door, but a smaller oven intended for pies, cakes and glazing could be located either in the main room or built into the wall of the separate bakery room.

A third fire in the scullery or in a laundry room solely to heat water was also a possibility, but even in quite large households all water would be heated in the main fireplace, and most washing up would be done by scrubbing with cold water and sand.

Depending on how the meals were arranged, the servants might have a separate dining room, but a scullery, a wet larder and a dry larder were certain, and a bedroom for at least the head cook would most likely also be connected to the kitchen. A pantry, where the dishes for the family would receive their final garnishing, could be located either by the kitchen or close to the dining room, and somewhere not too far from the kitchen there also had to be rooms for storing water and firewood.

In 1632 the chimney—basically a big funnel leading the smoke away from the fire below—was still a fairly new invention, and no one had even heard of an iron stove or range. Instead, the big kitchens would have a six to fifteen foot long fireplace with room beside the main fire for a series of small fires or coal baskets as well as a spit on cob-irons to suspend a piece of meat over a tray to roast in front of the main fire.

On the main fire, very large kettles of thinly beaten copper would be used for boiling large amounts of liquids, not just for cooking but for all the warm water needed in the household. Thick liquids—such as the daily gruel, porridge or stew for the servants and bread-thickened sauces for the fine table—tend to scorch if kept directly over a fire, so for dishes needing a long slow simmer there would be large clay pots with two handles for lifting by two persons, and smaller, three-legged clay casseroles with a long handle—hollow to keep the handle cool. These clay pots would first be brought to a boil on the fire and then pushed to the back of the fireplace, where they could be left to simmer surrounded with hot ash. The expensive brass pots of various sizes could stand quick heating directly on a fire or bed of coals, and were thus the best for roasting, braising and stewing,

where what was wanted was a quick browning rather than a long boil or slow simmer. Bronze frying pans with three legs and an very long handle were also a possibility, and for broiling there would be iron grids of various sizes. Baking the very popular pies and other delicacies on a daily basis was also possible in the main fireplace by placing the items in deep, hollow-lidded copper pans and heaping glowing coals both on top and below. All these different ways of heating the food would enable the cook to produce the elaborate dishes of roasts, pies, sauces, etc. needed for an upper-class household. A few of the most modern kitchens would also contain one of the first primitive stoves. These were not of metal, but were constructed as a masonry bench with hollows build into the surface to contain glowing coals.

All the kitchen rooms would be white-washed with tiled floors, and fairly high ceilings. The rooms with a wall to the outside might also have windows, but glass was expensive, so candles made from sheep fat were the main source of working light aside from the fireplace. The high ceilings might make the rooms seem fairly well ventilated, but by modern standards the 1632 kitchens would be very badly lit.

The water supply for such a big household had to be more efficient than having somebody draw and carry every drop used for both cooking and cleaning in and out of the house. The water still wouldn't be piped—nor was it likely to be clean enough for drinking—but there would most likely be a private well in the courtyard, lined with a hollowed-out log and closed with a pump. From this a trench of wood or stone would lead into a room near the kitchen, so the water could be pumped up from the well and into the water barrels or basins. There would probably be a hole in a kitchen wall, where dirty water could be sent either directly into the moat or into a sewage trench leading to a midden area on an estate, but in town all refuse was likely to end in the open gutter behind the house. Many major towns did try to make arrangements with the surrounding farmers for removal of feces and other firm garbage to fertilize their fields instead of stinking up the town, but these arrangements were rarely very efficient, and did little to clean up the water supply.

Due to the major fire-hazard of the kitchen fire and oven, the kitchen of a large household was often in a separate building—or at least in the other end of the house—from the room used to dine in. This made covered serving platters very popular, both for keeping the food warm and to keep

the flies away. These lidded platters would usually be of metal such as pewter, brass or bronze, and heated to aid in keeping the food hot. Carrying such hot and heavy loads from the kitchen to the table was often done by balancing the platters on the head of the servant with his hands holding onto the edge on each side. Aside from thick gloves, this made a padded hat necessary. The hat was usually black and shaped like a low version of what is now considered the traditional white chef's hat.

For the upper classes, waiting for breakfast was not likely to be a problem, but anybody going to an evening party would get much too hungry if not eating until after sunset in winter. These people would usually start the day with a warm drink—a posset, tisane, beer or wine—and a bit of sweet bread around nine or ten in the morning, followed by a small lunch at noon, while the largest meal would be in the evening.



The size of an upper-class lunch could vary from a few slices of fine wheat bread soaked in a glass of wine posset for a single lady of small appetite, to an elaborate serving of cold meat, pies, poached fresh fish, cheese, fruit and nuts for a large household with guests.

On an ordinary day, the main meal in the household of a wealthy merchant, prelate or nobleman would consist of up to a dozen dishes served in two or three sets. First would come the coarsest food such as porridge, stew, and various boiled, salted meats and fish. This serving would be for

everybody to eat, regardless of rank. Then the more elaborate dishes such as pies, roasted fresh meat with sauce, salads and other fine vegetables, game dishes, and jellied meat or fish would be served, but only to the family and the guests. Finally, a third set of fruits, cheese, nuts, and sweets might be served, but again only at the upper end of the table. At least, that was the theory. But since a table set with many work-demanding dishes twice a day was also a sign of prestige, a large number of the fine dishes would usually be passed down to the servant's end of the table.

The difference between the dishes eaten by upper-class and middle-class wasn't entirely a matter of number, variation and elaboration. In late-medieval times, a lighter diet with more vegetables and fewer spices had spread from Italy to the royal French court, and there replaced the heavy and spicy medieval dishes. By 1632 this style had spread to the German nobility and, while most people north of the Alps still considered raw fruit and vegetables to be unhealthy, it was fashionable to fill your table with stuffed cabbage, green peas in butter, braised lettuce, and steamed pumpkin salad with pomegranate seeds.

In a 1632 upper-class household, no one was likely to be eating directly from a common pot at the center of the table. Instead, each person would have a dinner plate of wood, clay, metal or—in very wealthy households—glass or porcelain. This made it possible to combine both firm and liquid food in individual servings, and the modern western combination of meat, sauce and vegetables had begun.

Forks were not yet commonly used and, in addition to spoons and knives, people used their fingers. This made hand washing both before and after a meal necessary and—as people would clean their fingers on the tablecloth as well as on napkins during the meal—the tablecloth might also need changing between each course at a large feast.

Cups and goblets were also becoming individual utensils, rather than being shared as had previously been the custom, but even when several wines were served for a large dinner, there would not be a row of glasses for each person. Instead, the servants would remove the empty vessels and clean them between each filling.

The plates, cups, etc. used were not the uniform dinner-sets we know today, but items of any size, shape and material. They would often be a combination of new imports and old heirlooms at the upper end of the table, while at the lower end they would be of local make. People also brought

their own service when traveling to visit friends and relatives, and even in royal palaces it was common for the prince or king to borrow cups, plates and platters from the surrounding estates in preparation for a major party.

Possible Changes after the Ring of Fire



The arrival of the Americans with their new ideas and products would certainly change the pattern above, but probably slowly and probably not in anything like a systematic way. The major USE towns such as Magdeburg are likely to be modernized first, but before the basics of clean, piped water, a sewage system, and electricity can be widely installed, the metal mining and production has to be increased and stabilized (water pipes, pumps, electric cords). In 1632 most of the German population was farm workers and small farmers, and in a pre-industrial society most of the population has to work at food production. So, in order to feed a sizable group of factory workers mainly recruited from this part of the population, farms must increase their yield (hybridizing, fertilizers, field machinery), and transportation (roads, railroads, wagons, motors) and storage (industrial freezers and refrigerators) become more efficient. In between and after these major basics are in place—which is likely to happen in a highly disorganized fashion town by town, area by area over several decades—smaller companies could set up production of items like iron stoves, textiles, vermin-proof jars, smaller freezers, electric lamps, vacuum cleaners, etc.

Side by side with the technological changes—but some times faster and sometimes slower—new ideas are likely to spread. From voting rights,

legal reforms, and social security to specialized farming, cooperatives, and a more healthy diet, all these changes are going to influence people's everyday lives.

For the householdless, it is to be hoped that the notion of social security would spread as the society grew more politically stable and democratic. Stipends for the old and disabled could go far toward removing the need to beg for a living—and might even leave people with some dignity—while more uniform laws—enforced for the rich as well as the poor—would also offer better protection for those totally dependent on their employers.

Another major change for this group of people would be that an industrial revolution is likely to severely reduce the number of people unable to afford a household of their own. Mass production in factories is likely to cause a lot of new problems, but this type of work generally needs less physical strength than doing things the pre-industrial way, and—providing the pay is in scale with the value of the product—it also pays better.

A new major population group of industrial workers recruited from the lower part of the servant and farmer classes would also cause new demands for food products. Apartments leave no room for keeping a pig or storing the pork, and even if running water, freezers and stoves make the entire process easier, the old system of self-sufficiency is likely to be replaced by much more daily shopping, fast-food and pre-fab meals.

For the poor households, a stable political environment combined with better storage and transportation would go far toward removing the danger of starvation due to war or crop-failure, and the spread of knowledge about nutrition should make the chance of not just surviving but also remaining healthy much better. Presumably a large number of this class would become part of the new industrial workers, but—even for those keeping their small farm or business—clean water, replacing salted meat with frozen, adding more vegetables to the diet, etc. would be major changes for the better.

For the well-to-do farmers, the changes are likely to be more in the farm work than in the household. To make the most of the new improvements bigger fields would be better—which would mean each village had to do a land reform or form a cooperative—more cash crops would be needed to pay for things like fertilizers and gasoline, and each farm or farming area would need to specialize in the crop or product best

suited for the location. More specifically: growing additional fodder crops would enable the cows to stay in milk over the winter and thus start dairy farming, cork stoppers for wine bottles would increase the popularity of the wine produced, refrigeration and better roads would make truck gardening possible, and, of course, potatoes would be in demand to feed the new industrial workers. As a class farmers tend to be rather conservative, but when farm workers start moving to the towns, the reforms are likely to speed up.

In the farm households, the biggest change is likely to be freezers—either on the individual farms or for each village. Things like other electrical applications, running water, and linoleum are also likely to be appreciated, but the biggest change should be the fresh, frozen food replacing the salted and dried.



For the town middle-class, the advances in transportation and preservation technology are likely to totally change their original pattern of self-sufficiency. This class would have the money to take advantage of the new knowledge and possibilities, and with the removal of the need to always keep food in storage for the following year, their eating pattern is

likely to change almost completely. Again, freezers are likely to play the main part, but iron ranges, private ovens, more goods in the stores, clean water, perhaps even running hot water, sewage removal, and public laundries are all going to have to make up for fewer servants being available.

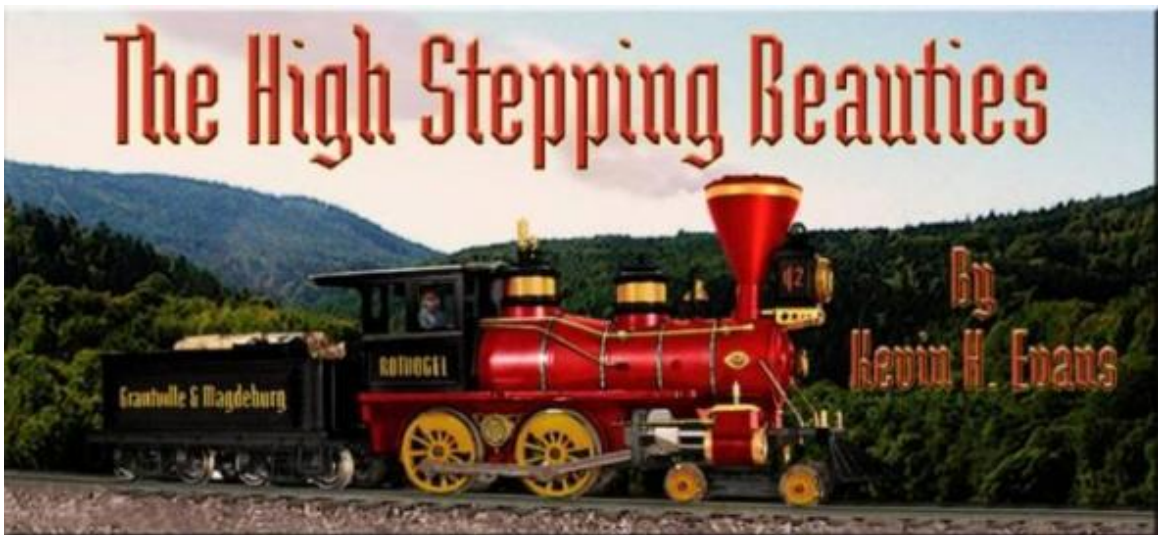
How the guilds would react to the changes is another matter . . . but the wives of guild members are likely to approve—while, of course, complaining about the outrageous wages now demanded by the servants.

The upper-classes rarely involved themselves directly in the running of their households and they already had access to the range of food available, but presumably modern changes would become a matter of prestige—same as it did in this world. Electric light, running hot and cold water, gas-heated glass-houses, more and bigger windows, etc. would all become available on the major estates and in the big town houses long before they did in the villages and poor households. As is this world, however, what started out as toys for the wealthy would eventually make life easier for their servants.

* * *

The High-Stepping Beauties

Written by Kevin H. Evans



Joseph stood on the platform, his eyes tightly shut, straining with his whole self to hear the whistle. It was time. The schedule said it was time, the whistle would tell. There it was, the distant chime. It was the first notes of a hymn always played by Mr. Schneider. Then there was the cloud . . . all white steam. And then the engine, a gleaming sparkling thing of power. Big wheels with bright red centers, shining rods dancing up and down like they were at a ball, glittering brass, blue trim, and sparkling iron. Under the window of the cab it said "Thomas." Joseph was excited. And today, he was to go, to Grandma's.

As time passes in Grantville, geared locomotives will not meet all the needs of the railroads. Stronger, faster locomotives will be needed to fill the demands that shipping and transporting people will bring. While geared locomotives are strong enough, they are, by their very nature, slower; and longer distances will require higher speeds for the trains.

The faster locomotives will probably be what is known today as American-class locomotives. This locomotive has a four-wheel pilot truck and four driving wheels; with a pilot wheel being about 24 inches in diameter, and a driving wheel being as much as 70 inches in diameter. It was commonly designated as a 4-4-0, and was the first truly successful class of locomotive made in North America. The four-wheel pilot allowed the locomotive to follow tight curves on relatively rough track, and the four drivers allowed a balanced and even application of power from the cylinders to the track.

These locomotives weigh somewhere between 20 and 90 tons, and should be able to pull about 15 full-size passenger cars or 25 to 33 freight cars. The locomotives are known as dual-purpose locomotives, because they can haul freight or passengers, with almost equal capacity.

The first locomotives in this class built after the Ring of Fire will probably have wooden frames with the cylinders bolted on. Also, all the running gear and suspension will be bolted to the wooden frame. The driving wheels will be large castings made of iron with steel tires fitted to the outside of the wheel. The drivers will also need counterbalancing weights cast into the wheel itself. This balances the thrust from the cylinders and the driving rods.

The complicated form of the drivers will require significant progress in casting large pieces of iron. The cylinders of the locomotive will probably be around 15 inches in diameter and will also be cast of iron. They then must be bored out to the piston diameter. Steam enters into the cylinders via a valve system, which will select the proper end of the cylinder for the entry of steam, allowing the cylinder to both push and pull, making it dual acting. The valves are controlled from a cam mounted on one of the axles of the driving wheels. Fuel and water for the locomotive will be supplied from a tender that will be attached permanently to the back of the locomotive. The drivers and pilot wheels will all be mounted on springs and connected so as to be equalized. This will allow the entire weight of the locomotive to be evenly distributed upon the wheels. The equalization will be set up so as to provide three points of balance. In a 4-4-0 this is usually achieved by equalizing the two drivers on each side of the locomotive as separate units, and then having the pilot truck as the third point of equalization. This creates a kind of tripod that balances the locomotive and improves its performance. Equalizing means that two or more wheels are connected together in their suspension by means of springs and levers, thus creating a single load-bearing platform.



The largest challenges involved in building these locomotives are in the large castings required from the cast iron industry and the precise machining required to make everything work smoothly. Several new types of machine tools will have to be built in order to finish the parts needed for the locomotive. The most important of these will be the cylinder-boring machine and the wheel lathes. Boring machines will probably be mounted directly to the castings of the cylinder blocks and will bore straight through the cylinder. This will not be possible until after they have been aligned using precision measuring equipment. The wheel lathes will need to be big enough to turn the diameter of the wheels and also to turn the profile of the tires mounted on the wheels. Most wheel lathes will have an attachment that allows the crank pin on the wheel to be machined so that it is in perfect alignment with the axles. Specifications and standards for these machines are available in the Machinery's Handbook which is available in the machine shops that came back through the Ring of Fire.

By the time these locomotives are needed, a locomotive and machinery works should be in existence. Therefore, large crews of workers will be available for the construction of these machines. The prototype, or first locomotives, of this class will probably take two or three months to build, but following locomotives should be completed in much less time. This will tend to create a group of locomotives that operate and are maintained in a similar manner. Furthermore, until we have a lot more locomotives and service, it is most likely the locomotives will have names and not numbers.

I feel that the 4-4-0 locomotive will be selected by the locomotive builders primarily because of its ability to fulfill the need for a better class of locomotive, but also because of the romantic attachment that most of the

steam enthusiasts have to this particular locomotive style. Indeed, these locomotives, when they were made in the 1800s, were known as the High-Stepping Beauties.

* * *

Seeing the Heavens

Written by Iver P. Cooper



"The soul without imagination is what an observatory would be without a telescope," according to Henry Ward Beecher. In the seventeenth century, solar system astronomy lay at the center of the debates as to place of mankind in the universe, and the relationship of religion and science. The telescope played a decisive role in these debates.

It is true that the Church and the royal courts have access to the books from the future, and know what they say about the Solar System. Certainly, the Pope in *1634: The Galileo Affair* is aware of those teachings and hence anxious to find a way to minimize the repercussions of the Galileo Trial.

It might seem that, with all the astronomy and physics books in Grantville, there is no dire need for improved telescopes. However, it is one thing to read something, and another to observe it for yourself.

Astronomers in Canon

None of the up-timers has a degree in astronomy. However, several have degrees in physics: John McDougal "Mac" Clements (M.S.), Charnock Fielder (1931–1634)(M.S.), James Michael "Jim" McNally and James Victor Saluzzo. Eve Zibarth was six semester hours short of a second major in physics, and Frederic Swisher studied some physics before he dropped out of college. There are also mathematicians in Grantville.

Any of the college grads could have taken an astronomy class or two. In fact, it is not exactly unusual for math-allergic liberal arts majors to satisfy their "science distribution requirement" by taking an astronomy class.

There are astronomy clubs in several West Virginia towns: Wheeling, Clarksburg, Charleston, Huntington, Athens, White Sulphur Springs, Tridelfia, and Morgantown.

The Morgantown (WVU) club presently has twenty-five members, and the club is affiliated with the WVU Physics department. It meets every other Wednesday (around the first and third quarter moons). On the Friday and Saturday nights near new moon the club often has a star party in Chestnut Ridge Park. The Physics department has the "Tomchin Planetarium and Observatory," with a Spitz A3P Planetarium Projector and a 14-inch Celestron telescope. This equipment is available to club members.

The other club reasonably close to Mannington (Grantville) is the Central Appalachian Astronomy Club in Clarksburg (south of Fairmont). Note that Fairmont State University has a satellite campus in Clarksburg. The CAAC owns the Good Hope Observatory, ten miles south of Clarksburg, which is equipped with a piggybacked Meade 16" F/10 LX 200 GPS Schmidt-Cassegrain with a Takahashi 4" FS-102 II, and a Williams Optics Zenithstar 80mm F/6. They also have a 14" F/10 LX 200 GPS Schmidt-Cassegrain, and, for solar observing, a Coronado Max Scope 60.

Unfortunately, I have not found any specific evidence that anyone from Mannington was a member of either of these clubs.

So far as light pollution goes, Mannington is in Bortle Class 4, "Rural/Suburban transition." (<http://www.novac.com/lp/wv.php>) But Morgantown and Fairmont are worse, and they have amateur astronomers.

Rick Boatright did an informal survey of his "middle-to-upper-middle class" neighborhood in 2000: "In the four blocks nearest my house, (16 house/street segments) there are 104 homes. In those 104 homes, there are ZERO reflecting telescopes, two sub-three-inch refractors, and 11 pairs of binoculars."

Still, it is now canon that at least one up-timer is an amateur astronomer of sorts: high school graduate Johnnie Farrell. See Peter Hobson's "Lessons in Astronomy" (*Grantville Gazette*, Volume 11).

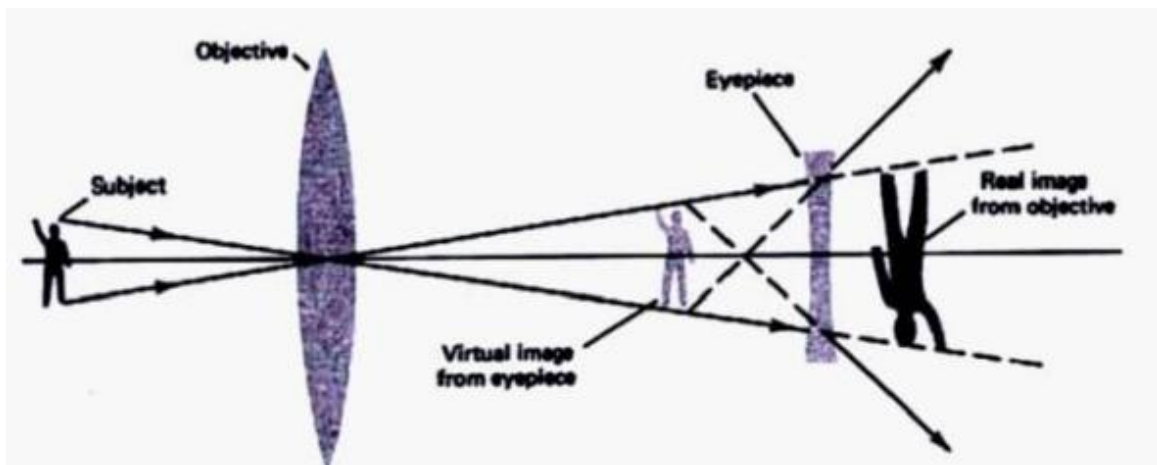
At the end of 1634: The Galileo Affair, the new Cardinal-Protector Mazzare wangles the appointment of Father Christopher Scheiner (1573–1650) to Grantville. Mazzare tells the Pope, ". . . we have books on astronomy in Grantville, and are creating a great university nearby at Jena—but we have no astronomers. And he is a superb one."

Refracting Telescopes and Their Problems

Credit for the invention of the telescope is usually given to Hans Lipperhey (Lippershey?), who filed a patent application on Oct. 2, 1608 (Panek 25). This touched off a priority dispute, with Jacob Adriaenszoon and Saccharias Janssen. The States General solomonically decided that none of them deserved a patent, on the theory that a device which was simultaneously invented by several parties was probably obvious.

The Lipperhey spyglass combined a weak biconvex lens away from the eye (later termed, the objective lens) and a strong biconcave lens near the eye (the eyepiece). In 1609, Galileo created his own spyglass; it used a planoconvex objective ("plano" indicating one side flat) and a planoconcave eyepiece. By March 1610, he had published his first set of observations, in *The Starry Messenger*.

The two basic refractor designs are the Galilean and the Keplerian (the latter described in Kepler's *Dioptrice*, 1611). Both use a planoconvex or biconvex objective lens. The Galilean uses a negative (planoconcave or biconcave) eyepiece, and the Keplerian a positive (planoconvex or biconvex) one.



The Galilean creates an upright image, whereas the Keplerian image is inverted. The Galilean telescope is also more compact; the distance between the lenses is the difference between the focal lengths of the objective and the eyepiece, whereas for the Keplerian design it is their sum.

On the other hand, for a given magnification, the field of view (FOV) of the Keplerian telescope is much broader. The FOV for the 20x Galilean design was perhaps fifteen arc minutes (half the diameter of the full moon).

Huygens' 1656 Keplerian refractor, 23 feet long, 100x, had a seventeen arc minute FOV. (Van Helden).

Also, in a Keplerian design, you can mount a micrometer at the focal plane, so you can measure the angular size of the object observed. (Pope GvK). The micrometer was first added by William Gascoigne (1620?–44) in 1638 (Bell 12).

Kepler was not an observer, and it appears that the first astronomers to use his design were Scheiner, and Francesco Fontana (1585-1656). In Scheiner's *Rosa Ursina* (1630), he noted that he had been using the new type for several years. Fontana, in *Novae coelestium terrestrium rerum observationes* (1646), claimed that *he* had put two convex lens into a tube back in 1608 (and thus to have priority not only over Scheiner, but also Kepler).

At the time of the Ring of Fire, most astronomers still had Galilean refractors. According to Van Helden, these typically had an planoconvex objective lens, with a focal length of 30–40 inches, and an aperture (stopped down) of 0.5–1 inch. Combined with an eyepiece of focal length 2 inches, that gave a magnification of 15–20x. As to the actual optical quality, he says, "The glass was full of little bubbles and had a greenish tinge (caused by the iron content of the glass); the shape of the lenses was reasonable good near their centers but poor near the periphery (hence the restricted aperture); the polish was rather poor."

However, Pope says that although Galileo's glass "suffered from many cosmetic defects," at the apertures he chose, his lenses "should have performed essentially as well as any modern lens of similar design."

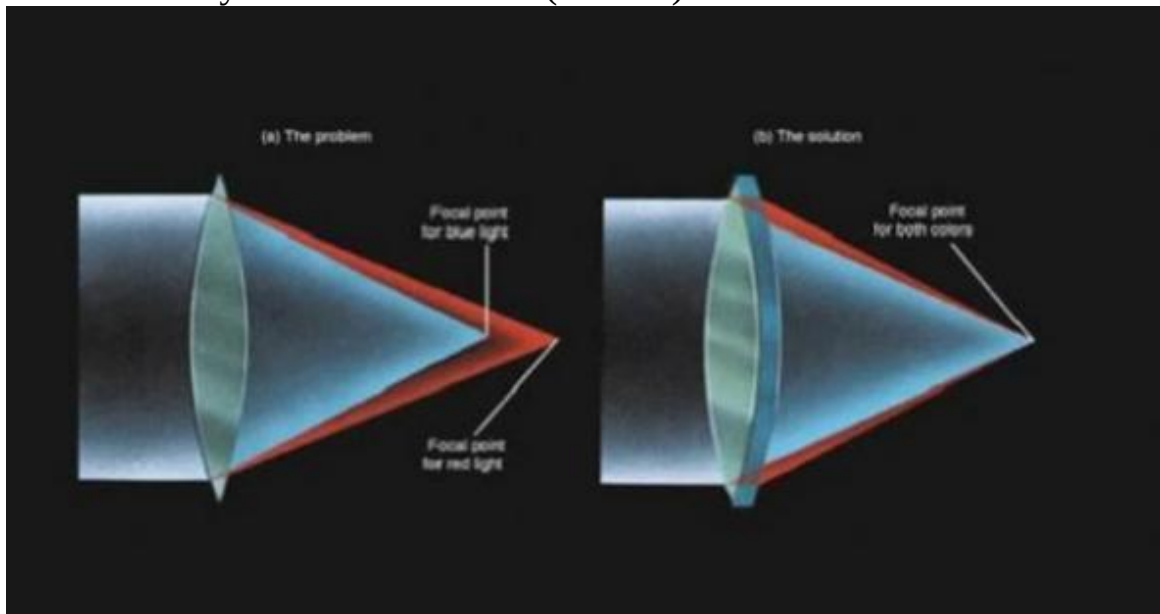
The Keplerian design was dominant by the mid-seventeenth century. The Capuchin friar Antonius Maria Schyrllaes de Rheita (1597–1660) added (1645) a reverting eyepiece to the Keplerian refractor, and also experimented with binocular telescopes.

The first telescopes were called refracting telescopes because convex lenses focus light by refracting (bending) it. The simplest convex surface to impart to a lens is a spherical surface. Unfortunately, if the lens has a spherical cross-section, then paraxial rays (rays parallel to the axis of the lens) passing through the lens near its center will not meet at the same point as those passing through the periphery of the lens. This problem is called spherical aberration, and results in a fuzzier image.

The problem of spherical aberration was recognized and mathematically analyzed by Rene Descartes, who published his analysis in 1637 (I don't

know how much he had already figured by, say, 1634.) Spherical aberration increases as the square of the aperture (Thompson 5), which of course discouraged attempts to increase light-gathering power by increasing the aperture.

Descartes also pointed out how to overcome the problem with lenses having a non-spherical surface. But attempts to grind such surfaces in the seventeenth century were unsuccessful (Bell 12).



There was a second problem which could not be solved solely by use of an aspherical surface. A simple lens will refract light of different wavelengths (colors) to different degrees (this is called dispersion), so each color has its own focus distance. Focus on an object, and it will have a reddish or bluish halo. This problem is called chromatic aberration. Isaac Newton discussed it in his *Optics*, and commented, "'tis a wonder that telescopes represent objects so distinct as they do" (417).

The spherical aberration could be reduced by using a high f-ratio (ratio of the objective focal length to the aperture). Perhaps more importantly, the relative chromatic aberration (the chromatic blur relative to the size of the image) could also be reduced by that strategy (Bell 11).

In consequence, the focal length of the objective, and hence the length of the telescope, was greatly increased. The Huyghens brothers used a twelve footer in 1655. The tubes of these long-focus scopes were made of wood, which was stronger than the paper or leather used by the Galileo, and lighter than iron.

By the early 1670s, Johannes Hevelius had built a 150-foot telescope. This was called an "aerial telescope" because it was suspended in the air. Pity the Renaissance astronomer who was observing on a gusty night! It didn't have a tube, strictly speaking; an illustration reveals that it was a long spar, with the objective attached at one end, and the eyepiece at the other, and wooden diaphragms at intervals in-between (Bell Fig. 11).

Newton comments that "very long tubes are cumbersome, and scarce to be readily managed, and by reason of their length are very apt to bend, and shake by bending, so as to cause a continual trembling in the objects."(421). While I am sure the 140-footer was a great tourist attraction, the productive work was done on somewhat more modest contraptions, 25-35 feet long and with apertures of 2-3 inches (Bell 18).

The first major improvement in refracting telescopes came in the eighteenth century, with the invention of the achromatic lens (originally by Hall in 1733, but rediscovered by John Dolland in 1758). This combined a positive biconvex crown glass and a negative concave-convex flint glass lens in such a way that their focal lengths were inversely proportional to their dispersions. Flint glass exhibited much greater dispersion than crown glass.

The purpose, of course, was to minimize chromatic aberration. Specifically, the design caused two wavelengths (e.g., red and blue) to focus at the same place. There will still be chromatic aberration at the wavelengths not specifically corrected for, but the degree of aberration would be less than for a traditional lens. The overall chromatic blur is reduced by about a factor of 40 (Smith, *Modern Optical Engineering*, 399).

The "Achromatic Telescope" is described in "Telescope," *1911 Encyclopedia*. Unfortunately, the essayist was more concerned with the merits of Dolland's claim to be the first true inventor than with communicating the practical details of how to construct an achromatic lens. The practical mathematics are in another encyclopedia article, "Aberration in Optical Systems," and see also "Light," "Dispersion (Optics)."

An achromatic lens may be a triplet; the encyclopedia mentions that Peter Dollond sandwiched a concave flint lens was sandwiched between two convex crown glass lenses.

In 1632, flint glass (a lead-rich glass of high refractive index) was unknown. Formulae for flint glass are in the encyclopedias, see Cooper, *In Vitro Veritas (Grantville Gazette, Volume 5)*, but it will take time to bring flint glass on the market.

To make an achromat, you have to be able to accurately determine the refractive index of a glass. Willebrord Snell (1591–1626) was the first scientist to measure the refractive index with sufficient precision to deduce the law of refraction (Snell's law, unless you're French, in which case you call it Descartes' law.) So this was "leading edge science" when Grantville arrived in Thuringia.

The achromatic lens is a type of doublet lens, that is, one which consists of two simple (singlet) lenses which are attached to each other. Even a cemented doublet potentially yields a big increase in quality from a singlet, since its three independently specifiable surfaces allow one to achieve a particular focal length and at the same time correct for chromatic and spherical aberration (Levenson 14). Cemented doublets are limited in size to perhaps three inches by the differential thermal expansion of the two glasses.

In an air-spaced doublet, a fixture holds the two simple lens in close proximity, with an airspace in between. There are four surfaces which can be specified, so the design can more readily correct for coma, too (Levenson 19). On the other hand, there are more air-glass surfaces and alignment is more difficult (Smith, *Modern Lens Design*, 115).

There are two ways of making an apochromatic lens, that is, one which eliminates chromatic aberration at three different wavelengths (e.g., red, green and blue). (Levenson 21-23). One is to use a triplet with appropriately configured surfaces.

The other is to make a doublet in which one of the lenses is made of a very low dispersion material, such as fluorite crystal or certain rare earth glasses. The low dispersion glass is not going to be available until well after RoF. And nowadays, such apochromatic lenses cost about twenty times as much as a "mere" achromatic lens (antiquetelescopes.org).

Reflecting Telescopes

The first reflecting telescope was built by Niccolo Zucchi (1586–1670), a professor of mathematics at the Jesuit College of Rome, in 1616. He used it to observe the belts of Jupiter in 1630. His book *Optica philosophia experimentalis et ratione a fundamentis constituta* (1652–56) may have influenced the later, better known reflector designs of Gregory and Newton. Zucchi's telescope used a bronze concave mirror instead of a lens. He viewed the mirror image through a lens, possibly handheld. Some authorities say that he had to put his head in front of the mirror in order to make observations—which would have been something of a nuisance. Others say that the mirror was tilted to avoid obstruction by the observer. With a tilted mirror, the light would be reflected obliquely, and the observer could stand to one side of the telescope tube.(Wilson, 2).

In 1630, French astronomer Marin Mersenne (1588–1648) proposed using a second, concave mirror to reflect the light down through a hole in the center of the larger primary mirror. (He may also have suggested that these mirrors be paraboloid in shape.) Unfortunately, René Descartes persuaded him not to proceed, apparently because of the difficulty of securing high quality concave mirrors of sufficient size. But Mersenne explained his design in his *l'Harmonie Universelle* (1636). (Rybski; Hong)

A similar design was proposed by James Gregory (1638–1675), a Scottish mathematician, in his treatise *Optica Promota* (1663). The telescope was to have used both a concave parabolic and a concave ellipsoidal mirror(ZOOM). The image formed would have been right-side-up, so the Gregorian telescope could have been used in the daytime to observe terrestrial sights, not just at night to see the heavens.

One of the disadvantages of the Gregorian reflector design was that it featured an eyehole in the primary mirror, which reduced its light-gathering power. Another was that an ellipsoidal surface is hard to grind. Worse, "if an optical system contains two sequential reflectors, regardless of their shapes, the combined effect is to magnify any geometrical imperfections in either surface."(Zebrowski 113) Gregory commissioned craftsmen to build a working telescope according to his plans, but without success(White, 169).

The credit for actual realization of the reflecting telescope goes to one of the intellectual giants of world history. Sir Isaac Newton (1642–1727), declaring that "the improvement of telescopes of given lengths by refractions is desperate," adopted a radically different approach, employing reflection, and "using instead of an object-glass a concave metal."

His speculum had a diameter of about 2 inches, and a thickness of one-third of an inch, and it was ground to the shape of a sphere with a diameter of about 25 inches. While not mentioned in Newton's *Optics*, it may safely be assumed that he placed it in the bottom of a tube and caught the reflected rays on a 45° secondary mirror, which in turn redirected the light to a planoconvex eyepiece.

The first Newtonian reflector was only about six inches long and magnified about 35 times. Newton says that the primary mirror was made of copper(420–21), but more likely it was speculum metal, which was then an alloy of six parts copper, two parts tin, and one part arsenic(CYBRATIONS).

Unlike Gregory, Newton did not place his trust in craftsmen to reduce his design to practice. "I asked him where he had it made," recalled John Conduitt, "he said he made it himself, & when I asked him where he got his tools he said he made them himself & laughing added 'if I had stayed for other people to make my tools & things for me, I would have never made anything of it . . .'"(White, 168).

With his new scope, Newton saw "Jupiter distinctly round and his satellites, and Venus horned."(Id.) Newton displayed it at a meeting of the Royal Society of London in December, 1671, and shortly thereafter he was voted in as a Fellow(White 169–71, RICE).

The great advantage of reflectors (telescopes with mirrors) over refractors (telescopes with lenses) is that they do not refract light. When light is reflected, all wavelengths are redirected at the same angle, so chromatic aberration does not occur.

The original Newtonian design had a spherical primary mirror. Like a spherical lens, a spherical mirror cannot focus parallel rays of light down to a single focal point; it suffers from spherical aberration.



In 1723, John Hadley (1682–1744) replaced Newton's spherical primary mirror with a parabolic one, thereby avoiding this problem. There is no doubt that Newton was aware of the advantages of a paraboloid shape over a spherical one. In analyzing refractor (lens-based) telescopes, he declared, "the imperfection of telescopes is vulgarly attributed to the spherical figures of the glasses, and, therefore, mathematicians have propounded to figure them by the conical sections" (Newton, 412); those, of course, would include the parabola. But Newton calculated (erroneously) that the contribution of spherical aberration to the scattering of the rays was only $1/5449$ th that of chromatic aberration. Having solved the latter problem by replacing lenses with mirrors, Newton was no doubt of the opinion that the additional sharpness achievable with a paraboloid mirror was insufficient to justify the effort necessary to grind a mirror to that shape.

Hadley's greater contribution was that he devised a reliable method of monitoring the approach to a parabolic cross-section. First, he ground the mirror to a spherical shape. Then he ground the mirror more deeply in the center than at the periphery. Without his assay method, this would have been entirely hit-or-miss. But he "placed a tiny illuminated pinhole at the mirror's center of curvature and examined the reflected cone of light in the vicinity of the image. From the appearance of this cone, Hadley could infer the state of the mirror's surface and was thus able to pass, by successive polishings, from a spherical to a paraboloidal figure." (TRIPOD) Like Hadley's telescope, modern Newtonian reflectors use a parabolic primary mirror.

Problems in mirror grinding and in maintaining an untarnished surface discouraged the early adoption of reflector telescopes.

Other Telescope Designs

In the Newtonian reflector, an on-axis planar mirror moves the focal point of the primary mirror (spherical or parabolic in shape) outside the main telescope tube. The eyepiece tube is perpendicular to the main tube. In the older Gregorian design, it was parallel to the main tube, and aligned with it. Of course, while Newton avoided the need for an eyehole in the primary mirror, his secondary mirror would of course prevent some of the incoming light from reaching his primary mirror in the first place.

Herschel tried eliminating the secondary mirror altogether. That made it a "front view" telescope (like Zocchi's), and Herschel tilted the mirror so he could see the image without blocking the view. A "Herschelian" reflector, of 48-inch aperture and 40-foot focal length, was used by its "inventor" to discover Enceladus and Mimus. (Bell 33)

Herschel had eliminated the light loss due to the secondary mirror, which was rather high with speculum metal. Unfortunately, it wasn't easy for the observer to see into a large Herschelian reflector if the target were near the zenith—forty-foot ladders being somewhat rickety.

Also, the tilt created an astigmatic distortion, albeit one alleviated by the high f-ratio (Doherty 16).

Hence, we turn the clock back to the early seventeenth century to look at an alternative design. Laurent Cassegrain (1629–93), a Catholic priest, wrote a paper on the megaphone, published in the *Proceedings of the Paris Academy of Sciences* for 25 April 1672. An accompanying note described his telescope design. A Cassegrain telescope is a wide-angle reflecting telescope with a concave mirror that receives light and focuses an image. A second, convex mirror reflects the light through a gap in the primary mirror, allowing the eyepiece or camera to be mounted at the back end of the tube.

While not pointed out by Cassegrain, the combination of a concave mirror and a convex one tends to limit the adverse effects of geometric imperfections in either surface. Despite this advantage, the Cassegrain reflector sank into obscurity for almost three hundred years, under the weight of Newton's scathing criticism of it (Zebrowski, 114).

Catadioptric Telescopes

If the primary mirror of the Cassegrain reflector were spherical, it would suffer from spherical aberration. A correcting plate (a lens) was added (in front of the primary mirror) in 1930 by the Estonian astronomer and lens-maker Bernard Schmidt (1879–1935), creating the Schmidt-Cassegrain telescope (ZOOM). Since it uses both a mirror and a lens, it is called a *catadioptric* design. The Schmidt correction lens was flat on the front side, and had a complex curve on the rear side.

A. Bouwers of Amsterdam, Holland, in February of 1941 and Dmitry Maksutov of Moscow, Russia, in October of 1941 independently invented an alternative correction lens which was curved on both surfaces. It is called a meniscus corrector shell, and the overall telescope design which incorporates it is called a Maksutov-Cassegrain reflector. In 1957, John Gregory realized that the secondary mirror could be dispensed with if a small central portion of the rear surface of the meniscus corrector shell were silvered to make it reflective. The result was the "Mak" reflector. (Weasner).

In what is now called the "classical" Cassegrain design, the primary mirror is parabolic and the secondary mirror is hyperbolic. This avoids spherical aberration without the need for a corrective lens. It is unclear whether Cassegrain himself conceived of the hyperbolic secondary mirror; or whether it was a later development. Accurately grinding both parabolic and hyperbolic mirrors would have been extraordinarily difficult in the late seventeenth century.

Mirrors for Telescopes

The mirrors for reflecting telescopes were usually made of speculum metal, a mixture of copper and tin. The metal at best reflected only about 60% of the light (Swadha; Thompson 13), and less as it tarnished.

Newton recognized both the problem, and a possible solution: "because metal is more difficult to polish than glass, and is afterwards very apt to be spoiled by tarnishing, and reflects not so much light as glass quick-silvered over does, I would propound to use instead of the metal a glass ground concave on the foreside, and as much convex on the backside, and quick-silvered over on the convex side." In other words, he had conceived of a back-silvered glass concave primary mirror.

However, nothing came of this suggestion until the German chemist Baron Justus von Liebig devised (1835) the method of depositing a film of silver on a glass surface. This technological advance made large reflectors practical. The preparation of speculum mirrors was an esoteric art, while many nineteenth-century workers knew how to grind and polish glass.

Also, while glass was fragile, it was still easier to handle than speculum metal, which one writer has called "wilfully perverse." Speculum metal was also more than three times the density of plate glass (Texereau 25).

The story of the 1870 Melbourne Cassegrainian reflector is instructive. The Australians decided not to use the newfangled silvered glass mirror. They ordered a 48" (1.2 meter) speculum mirror from Dublin. It was only with the third attempt at casting that success was achieved. The mirror was shipped with a protective coating of shellac. When the Australians removed the shellac, they damaged the reflective surface. Rather than shipping the mirrors back to Ireland, the Australians decided to polish it themselves, with unhappy results. G. Ritchie wrote, "I consider the failure of the Melbourne reflector to be one of the greatest calamities in the history of instrumental astronomy." (Learner, 107–9).

Finally, while silvered mirrors, like speculum metal, will tarnish, the silver of a silvered glass mirror could be dissolved away and replaced with a fresh coating, leaving the mirror shape unaffected. (GEOCITIES)

The first silvered glass reflecting telescope, just 4 inches in aperture (smaller than the one I owned as a high school student), was built by

Steinheil in 1856. Foucault made a 13-inch silvered glass mirror in 1857. Soon thereafter, a reflector with a 48-inch silvered glass mirror was installed at the Paris Observatory, but its performance was mediocre.

Big Glass

The problem with reflectors was that they were much more sensitive than refractors to temperature effects, to the flexion of the telescope tube, and to misalignment of the optics. Nonetheless, for large telescopes, they had substantial advantages.

As lenses were increased in size, they had to be made thicker, which increased their absorption of light. This was particularly a problem for astrophotography, as the film was most sensitive to violet and ultraviolet light, and flint glass strongly absorbed these radiations. The large lenses also had to be supported at the edges, and hence liable to warping. In contrast, silvered mirrors strongly reflected violet and ultraviolet light, and large mirrors could be supported all the way across the rear of the mirror "blank," rather than just at its edges (Learner, 110).

Toward the end of the 1930s, silvering was superseded by aluminizing. While aluminum is not quite as reflective as silver, it is much more durable. To recoat a mirror, it must be lifted out of its frame. The Mount Wilson mirror weighed four tons; obviously, the less it had to be played with, the better.

Another advantage of aluminum is that when it is oxidized, the resulting aluminum oxide coating is transparent, whereas silver oxide is black (think "tarnish").

Another important development in the history of telescope making was the invention of PYREX® glass. This glass was much less sensitive to temperature changes than plate glass. The first use of PYREX® glass in a large telescope was in the 76-inch reflector for the Canadian David Dunlap Observatory (Learner, 118).

Eyepieces

The purpose of the eyepiece (ocular) is to enlarge what is seen at the focal plane. The magnification obtained is the ratio of the focal length of the objective (mirror or lens) to the focal length of the eyepiece.

Unfortunately, the greater the enlargement, the smaller the field of view. Which is why big scopes often have guide scopes piggybacked on top of them. Raising magnification also makes the image dimmer.

The original Galilean eyepiece was a singlet. Since light can come into the eyepiece at steep angles, the designer most worry, not only about spherical and chromatic aberration, but also coma, astigmatism, and other distortions. The use of multiple elements (see table) allows the correction of one or more distortions. A compound ocular was first constructed (Augsburg, 1649) by Johann Wiesel(Dijksterhuis 60); the better known Huyghens eyepiece was made in the 1660s.

Eyepiece	Collector	Field Lens	Eye Lens
<u>Huyghens, Ramsden</u>		Singlet	Singlet
<u>Kellner</u>		Singlet	Doublet
<u>Erfle</u>	Doublet	Doublet	Doublet
<u>Orthoscopic</u>		Triplet	Singlet
<u>Plossl</u>		Doublet	Doublet
<u>Cooke</u>		Triplet	Doublet

(Levenson, 48-52).

The 1911 "Telescope" article has figures showing the Kellner and Cooke eyepieces, and the Huyghen and Ramsden eyepieces are depicted in the "Microscope" essay. The Erfle, Orthoscopic and Plossl designs may be more difficult to recreate.

Mounting the Scope



The purpose of the mount is to support the telescope, with minimum vibration, yet permit it to be readily pointed at a target and to track the target's movements. And, of course, if the telescope is not in an observatory, the mount has to be light enough so the telescope is still portable. These goals are not easily reconciled.

The intricacies of predicting where a celestial object will be at a particular time, and the various coordinate systems in which its location can be expressed, are covered in my article, "Soundings and Sextants" (and I am very glad I don't have to explain them a second time).

Here, I will concentrate on the issue of how to mount the scope so you can point it in a particular direction. Telescope mounts are diagrammed and discussed in the 1911 "Telescope" article, and of course pictures of telescopes in various books on astronomy will inadvertently reveal additional variations on the theme.

General purpose telescope mounts, in order to point anywhere in the sky, must be freely rotatable on two axes, and for scientific use you have to be able to set the angle on each axis. The two basic mounts correspond to the two basic coordinate systems.

An altitude azimuth ("alt-az") mount has vertical and horizontal axes. The vertical axis allows the user to set the altitude and the horizontal axis, the azimuth. An alt-az mount is similar to a gun mount on a battleship. One form of alt-az mount is shown in Hevelius, *Selenographia* (1647).

One common implementation of an "alt-az" mount is a "rocker box"; the vertical axis is provided by a yoke, and the yoke is pivotably mounted on a horizontal base. Another is found on some camera tripods; one end of a C-shaped arm is attached to the base, which rotates on top of the tripod, and the other end provides a pivot for the telescope. This is only suitable for small telescopes.

In an equatorial mount, the base, instead of being horizontal, is tilted so it is parallel to the earth's equatorial plane. The advantage of this is that the apparent motion of the stars is the result of the rotation of the earth and, with an equatorial mount, one just needs turn the telescope on the one axis (which points toward the north or south pole), in order to keep a star in view. That in turn means that the telescope can be kept pointing at the star by hooking it up to a simple clock-regulated motor drive. In contrast, with an alt-az mount, the telescope must be adjusted on both axes to keep a star in view.

The two axes of the equatorial mount are the right ascension and declination axes, which are the tilted counterparts of the altitude and azimuth axes of the alt-az mount. The RA axis points toward the pole so turning the telescope about that axis tracks the star.

The first equatorial mount is believed to have been constructed by Scheiner (!) in 1638, for a helioscope (King 42).

There are many different ways of implementing the equatorial mount (Smith).

My home telescope of decades past used the German equatorial mount, which features a lopsided-T. The crossbar serves as the declination axis. The midpoint of the telescope tube is pivotably mounted to the short end, and a counterweight is slid onto the long end.

The central staff of the T is the RA (polar) axis. On a large observatory scope, it will probably be held on a fixed, slanted pier, customized so that

the slant causes the RA axis to point toward the pole. On a portable amateur scope, it will be pivot-mounted on a tubular base, the base lockably hinged to a pedestal (so the angle can be changed if the telescope is moved to a location with a significantly different latitude), and the pedestal mounted on a tripod.

There are two problems with a German equatorial mount: the polar axis is subject to a lot of stress (since the tube hangs on one end) and the telescope sometimes has to be swapped from one side of the pier to the other ("meridian reversal").

Next we have the English cross axis. Instead of a T, we have something like a plus sign. Imagine that one bar of the "plus" is short and horizontal; that is the declination axis and the telescope tube and the counterweight are attached to opposing ends. The other bar (the RA axis) is long and threads through the declination axis; one end touches the ground and the other (the high end) is attached to two legs. Thus, the RA axis and its legs form a lopsided tripod, with the polar end of the RA axis high off the ground (high enough so the telescope can be rotated all the way around the declination axis).

In the English yoke, the declination axis is modified; instead of the telescope tube being attached to one end, it is mounted "inside" the center of the axis, in a rectangular yoke. At the midpoint of the long sides of the yoke there are opposed pivot points to which the tube is attached; these form the declination axis. The short ends of the yoke are attached to opposing pivot points, the ends of a large L-shaped base, to form the RA axis. This is the design which was used to mount the Hooker Telescope on Mount Wilson. It is stable but can't be used to see stars close to the pole because the tube would crash into the yoke (which is shorter than the tube) if you tried.

The "horseshoe" mount (Savard) is a modification of the English yoke. The higher of the short ends of the yoke is replaced by a C-shaped piece (the "horseshoe") which cradles the telescope tube when it points toward the pole. In essence, we have modified the piece of the yoke which the tube would otherwise crash into. The "horseshoe" itself is supported by the high end of the L-shaped base.

The English Fork combines the polar axis of the German mount with half a yoke mount (that's the "fork"). It doesn't require a counterweight. It

may be thought of as the equatorial analogue of a rocker-box; the base axis of the fork sits on a wedge (pier) instead of lying horizontally.

There are still more mount designs . . . but it is clear from the foregoing that the astronomers of the new time line have plenty of choices.

The cost of building a telescope with an equatorial mount increases as roughly the 2.7th power of the diameter of the mirror (AST110).

In general, the equatorial mount is heavier and more expensive, and the modern trend in the old time line was to return to the alt-az mount. Computers can be used to drive movement, simultaneously, on both axes. Of course, in the decade following the RoF, and outside the vicinity of Grantville, computers are going to be hard to come by.

* * *

There are special mounts which afford more limited movement (but are cheaper and more stable than the general purpose mounts).

A transit telescope, like a telescope with an alt-az mount, can be adjusted vertically, but it cannot turn horizontally. It always points somewhere on the half circle corresponding to the upper half of the local meridian (i.e., north or south). It is used to create star catalogues; when a star crosses the local meridian its altitude (declination) is measured and the time (right ascension) is noted. The transit telescope can also be used to accurately determine the time, based on when a star of known right ascension crosses the meridian.

A poor cousin of the transit telescope, a "meridian circle," was used by Tycho Brahe. It was a quadrant; the altitude was measured as with a transit telescope, but the star was sighted with the naked eye.

A zenith telescope is even simpler than a transit telescope; it points directly overhead. Such telescopes, which are cheap to construct even when large in diameter, were traditionally used in latitude and time measurements. There are now some very large zenith telescopes which use, as their mirror, liquid mercury. When spun, it naturally assumes a paraboloid surface.

Drives and "Gotos"

The equatorial mount made it possible to automate the process of tracking stars by using a weight-driven clockwork mechanism to turn the telescope at just the right speed about the polar axis.

At some point in the twentieth century, the clockwork drive was replaced by an electric motor.

Advances in electronics made it possible to "drive" a telescope with an "alt-az" mount, rotating it more or less simultaneously on both axes.

The next step was the "goto" telescope, which could not only track a star, but could also "jump" to one. Canon says that there is a "goto" telescope in Grantville. When the "goto" is turned on, it may ask the observer to enter the longitude and latitude, or try to locate itself from a GPS signal (the latter won't work after RoF, of course). The "goto" also needs the time and date. (Obviously, it is not going to accept a date of "1632.")

What date and time do you enter? Ideally, you enter a date in the twentieth century which is within the "goto" date range but is an integer number of sidereal days separated from the actual date of observation in 163x. (The sidereal day is the time interval between two successive crossings of the same celestial meridian by a star. Or, less precisely, the time for the star to return to the same apparent "place in the sky.") This will require a bit of calculating but once you have identified one correspondence you can just count days forward from there.

When the "goto" is turned on, the user has to calibrate the system by pointing the scope at one or more bright "alignment" stars in the unit's database. This will allow the unit to correct for errors in the mounting of the scope, or in the observing parameters.

The unit's database, of course, is going to be expecting the stars to be in the positions in the celestial sphere which they occupied around the year 2000. As opposed to 163x. The positions are going to be something like five degrees off.

Obviously, the "goto" isn't designed to correct for time travel-impelled precession, which is the revolution of the North Celestial Pole around the North Ecliptic Pole. However, it will think that the astronomer has failed to point the RA axis of the scope toward the NCP and correct for this "polar

misalignment." Thus, it will unknowingly try to correct for precession. What I am not sure of is whether there is a limit on how much polar misalignment is correctible. At some point the "goto" may just "shrug electrons" and refuse to do anything.

Telescope Performance

The astronomical telescope is a device for gathering light so that the observer can see dim objects which are far away. It takes almost all of the light which falls on a relatively large diameter lens or mirror (the objective) and delivers it to your eye (pupil diameter about one-quarter inch). The light gathering power is proportional to the effective area of the objective, and thus to the square of the aperture (the effective diameter). The aperture is sometimes less than the nominal diameter; stopping down (blocking the periphery of) the objective can counteract certain optical imperfections. Galileo's telescopes were stopped down.

Since telescope mirrors are not perfectly reflective, and telescope lens are not perfectly transparent, there is some light loss at every optical surface. Crown glass reflects away four percent of the light at each surface; each simple lens is two surfaces and thus a net light loss of eight percent. A silver mirror loses about the same amount of light to absorption.

Sharpness is a function of the resolving power of the telescope, the clarity of the atmosphere, and the visual acuity of the observer.

The theoretical limit on the resolving power of the telescope is set by diffraction. Light behaves like a wave and when it passes through a small hole (the opening of the telescope), it forms "diffraction rings." If you are trying to see small detail, adjacent bright spots form overlapping rings of light and darkness. The "Dawes limit" (suggested for observing double stars of equal brightness) on a perceptible separation is 4.56 arc seconds divided by the telescope's aperture (the useable diameter of the front lens or the primary mirror) in inches.

Useable magnification is something like 20x–30x per inch of aperture for seeing planetary detail, and 50x per inch for "resolving" (separating) double stars. (Nagler). Fifty times 4.56 arc seconds is 3.8 arc-minutes, and the normal naked eye can resolve 2-3 arc-minutes.

Imperfections in the telescope can reduce sharpness and contrast. These imperfections could be a function of the design (a spherical surface will create spherical aberration, if not corrected in some way; a flimsy tripod will vibrate) or of its implementation (an inaccurately ground lens or mirror; misalignment of the optical elements; a misplaced counterweight).



The atmosphere, of course, itself is not transparent even at the best of times, with light being scattered or absorbed by air molecules or particles. Turbulence in the atmosphere causes wobbling of the light waves, making it more difficult to see detail. The "twinkling" of a star is typically by an angle of 0.05–2 arc-seconds (Martinez 190); compare this to the Dawes Limit.

Astronomers learned to site their telescopes at high-altitudes (less atmosphere to peer through) and to wait patiently for moments of clear seeing. At least light pollution is not going to be a big issue in the early seventeenth century. Especially outside the immediate vicinity of Grantville.

Visual acuity is affected by innate acuity, age, eye disease, dark adaptation, diet (eat your carrots!), fatigue, and observing technique (Slotegraaf). Galileo apparently had ophthalmia when 12 or 13 (Pope). Newton was near-sighted (CoO), and Kepler's vision was so bad that he relied on the observations of others. Hevelius, on the other hand, was said to be able to see seventh magnitude stars with the naked eye (HAO).

Telescopes in Grantville Before RoF

George W. Bowers, of Bowers Mansion fame, was an amateur astronomer, but it is doubtful that his telescope, let alone his astronomy books, will be considered canon.

Johnnie Farrell shows Father Scheiner (a famous down-time astronomer) his eight-inch Schmidt-Cassegrain "reflector" (it's really a hybrid reflector/refractor) with an equatorial mount and a "goto."

There might be another "real" telescope or two at the high school.

According to the North Marion High School website, a course called "Earth and Sky" is available to eleventh and twelfth graders. I don't know when this course was first given.

There are, of course, other up-time telescopes in Grantville. For one thing, there are spotting scopes mounted on rifles. Julie uses a Remington Model 700 with an ART-2 scope (1632, Chap. 39). There are references to additional scopes in Van Natta, "Curio and Relic" (*Grantville Gazette*, Volume 1), Donahue, "Skeletons" (*Ring of Fire*), and Flint and Zeek, "Suhl Incident (1634: *The Ram Rebellion*).

Typically, whitetail deer hunters use rifle scopes with magnifications of 3x–9x, and objective diameters of 40–44 mm. The lenses may be coated to reduce reflection, and high-end riflescopes may use achromatic objectives.

Julie is either using a Leatherwood M600 version (3–9 x 40 mm) or an M1200 (6–9 x 50 mm).

You may find a military rifle sold with a scope that offers a high magnification (up to 40x) and a large objective lens (up to 75 mm). They aren't very useful for hunting or warfare, in view of their weight and field of view, but they may come in handy for astronomers. (Optics Planet).

Birders may also have spotting scopes, although binoculars are more common. In 2000, a typical birding scope had a zoom eyepiece with a magnification of 20x–60x, and an objective diameter of 70–90 mm (Birdwatching.Com).

Then there will be the "toy scopes." These are the ones which are sold to unsuspecting parents whenever a new comet is discovered (Kohoutek) or an old one returns (Halley's). Anything purchased in a department store or

toy store is worthless by modern standards. But perhaps not for a down-timer.



The advertising for the toy scopes touts magnification. However, for magnification to do you any good, you need to gather enough light. One rule of thumb is that the maximum useful magnification is 50x per inch of aperture (the useable diameter of the objective), and the toy scopes usually violate this rule. The lenses are likely to be spherical singlets (subject to aberration), and they may be made of plastic, not glass. The material may be inhomogeneous, or high in dispersion. The surfaces may be poorly figured (curved surfaces not really spherical), they may be "wedged" (front and rear surfaces not parallel), and they may even display ripples. They may be heavily stopped down to hide some of the defects. Even if the lenses themselves are acceptable, they may be poorly collimated (that is, optical axes not aligned). And the mounts are likely to be flimsy.

How would "toy scopes" compare to down-time telescopes? I suspect that they are better on average, but that the best down-time scopes are superior to the worst "toy" scopes.

Unfortunately, I have not been able to find any head-to-head comparison of a department store scope to an authentic Galilean telescope. I did find a site (ATS) which compared a Tasco of 60 mm aperture (claimed magnification of 660x!) with an Astro-Physics of 155 mm aperture. The theoretical resolution of the Tasco, for yellow light, would be about 2 arc-seconds. It is obvious from the comparison that the actual resolution was quite a bit worse, but they didn't quantify it.

Galileo's 21X leather-bound scope, with a 37 mm nominal diameter and a 15 mm aperture, has a theoretical resolution of 8 arc-seconds. Its actual resolution, determined by measurement, is 10-arc seconds. That implies that its optics are quite good, regardless of glass imperfections. Pope's replica of a Galilean scope, with a 23 mm aperture, resolved 6 arc-seconds. (Pope)

If a reader has a department store telescope, he or she can compare it to Pope's replica by using it to read newspaper text at a distance. To equal the performance of that replica, it would need to be able to read 2 mm (8 point) newspaper type at a distance of 100 feet.

In 1660, when the Tuscan *Accademia del Cimento* was directed to judge who was the better telescope maker, Eustachio Divini (1610–85) or Giuseppe Campani (1635–1715), they tested the telescopes by using them to read texts at a distance, and gave the laurels to Campani. Nonetheless, Divini's telescope was good enough to see Saturn's shadow on its ring (Medicean Skies).

Perhaps the best method of comparison, absent formal resolution measurements, is to ask what one can see with these department store scopes as opposed to what the seventeenth-century astronomers saw.

In 1655, Huygens (1629–95) discovered Titan, and clearly distinguished the ring of Saturn from the planet, using a telescope of twelve-foot focal length and small aperture. With a 23 footer of 2 1/3 inch aperture, he observed Syrtis Major on Mars. Cassini (1625–1712) found Iapetus with a seventeen footer and Rhea with a thirty-four footer; and discovered the Cassini Division (the internal gap of the ring) with a twenty footer at 90x magnification. (Bell 18).

The impression I have, from internet browsing, is that the department store scopes will usually show the rings of Saturn, but not the Cassini Division.

If the "toy scopes" in Grantville are better than Galileo's instruments, they certainly aren't much better.

Making New Telescopes

The Grid contains the following interesting comment: "Cathy and Matt (McNally) are beginning to act as assistants to their father (Jim McNally, the optician) in his venture with Dave Marcantonio, the owner of the smallest machine shop in town. They have created excellent telescopes which undercut the price of the artistic items from Nuernburg. They aren't nearly as pretty, though."

A private communication from Laura Runkle confirms that McNally was able to grind his own lenses. "He really is based on someone who still has lens-grinding equipment in the back of the shop for strange orders. The optician is also a physics grad."

Of perhaps equal importance, when barflies visited Mannington in 2000, they discovered that the high school science department had the first volume of Ingall, *Amateur Telescope Making* (4th ed., 195x) (ATM).

We have three kinds of optical elements to consider: glass mirrors, glass lenses, and metal mirrors. While glass mirrors weren't available in the seventeenth century in our time line, and the other two elements were, the emphasis on ATM is on the glass mirror and hence I will consider that first.

Making Glass Mirrors

The most common mirror shape for a reflecting telescope is paraboloid. While a modern shaving mirror may be at least roughly paraboloid, that doesn't mean that it is useable as a telescope mirror.

First of all, like most mirrors in common use, it is a rear surface mirror. That means that the reflective aluminum coating is on the rear surface of the glass. Unfortunately, if a rear surface mirror is used in a telescope, you will have a ghost reflection off the front surface. Telescope mirrors have a silvered or aluminized front surface.

Secondly, shaving mirrors are very low magnification and hence don't have to be manufactured to the same tolerances as telescope mirrors.

To obtain a resolution as good as Rayleigh's theoretical diffraction-based limit, that is, a one-quarter wavelength difference at the wave front, the optical surfaces of the telescope must be accurate to within one-half wavelength of the light for a refractor and one-eighth wavelength for a reflector. (Texereau 6–7). One-eighth wavelength, for yellow-green light, is three millionths of an inch (Berry 236).

There are essentially five steps in making a glass mirror (Howard, 14–7):

- 1) Rough grinding. The mirror glass blank is placed on top of a similar sized piece of glass (the "tool"), with grit in between. The grinder makes long strokes, in every direction, with the top glass, and this results in the upper piece becoming concave and the lower piece, convex. A template of some kind is used to determine when the center is deep enough to correspond to the desired focal length. If the grinding was symmetrical, the mirror blank now has a roughly spherical surface.

- 2) Fine grinding. Shorter strokes and progressively finer abrasives are used to create a more smoothly spherical surface. The surface is tested to confirm sphericity.

- 3) Polishing. The glass tool blank is replaced with a "pitch lap" (see below) and the abrasives with polishing agents (e.g., rouge).

- 4) Figuring. Continuing to use the "pitch lap," we "parabolize" the surface. Such figuring is impossible without a proper test method (see "Foucault tester" below) since mechanical gauges cannot discern differences on the order of millionths of an inch.

In theory, there are three ways of altering a spherical surface into a paraboloid (Thompson, 74). The simplest involves deepening the center, tapering off to zero change at the edges. This slightly reduces the focal length of the mirror. If you remove too much (over-correct), you get a hyperboloid, and if not enough (under-correct) you are left with an ellipsoidal mirror.

Please note that if the mirror is small enough, or its f-ratio high enough, it can be left spherical. That would be the case, for example, with a 6-inch f/12 mirror (Thompson 186; cp. Texereau 19).

5) Metallizing. Finally, we silver or aluminize the surface. Amateur telescope making manuals have instructions for silvering, but not aluminizing. Of course, we hardly have enough aluminum for it to matter.

Thompson (197) estimates that the first four steps should take the average amateur, working alone from book directions, about thirty to forty hours for a "starter" (six inch aperture, f/8) mirror. Howard (277) adds that the difficulty of making a mirror increases roughly as the third power of the aperture.

Glass. Howard recommends PYREX® borosilicate glass for the mirror blank and plate glass (which is a soda lime glass) for the tool blank.

Borosilicate glass will not be available in quantity for several years after the Ring of Fire. See Cooper, *In Vitro Veritas (Grantville Gazette, Volume 5)*. Canon says that the USE is attempting to obtain boric acid from the Maremma of Tuscany as of 1634. See Cooper, *Under the Tuscan Son (Grantville Gazette, Volume 9)*.

Soda lime glass is available, but it is not produced in the form of plate glass. The largest available size is only a few feet in diameter, and the quality leaves much to be desired. This isn't a big problem for the tool blank, but until borosilicate glass is put in production, we will be using soda lime glass for the mirror blank, too.

Of course, there is some modern plate glass which could be scavenged. Unfortunately, it is probably too thin for use as a mirror blank. For a six inch mirror, the minimum thickness (given that the mirror must not flex too much when supported at three points) is 0.9 inches, and it increases roughly as the square of the diameter (Texereau 27).

The standard window glass thickness is one-quarter inch. The normal range is perhaps one-eighth to one inch.

Obviously, the requirements for glass quality are more stringent if the glass is being ground to make a lens, since then we must worry about its transparency. For the glass of a glass mirror, inhomogeneity matters mostly because, under the stress of a change of temperature, the mirror surface could be distorted.

Abrasives. The preferred abrasives are carborundum (silicon carbide) for coarse grinding and corundum (aluminum oxide) for fine grinding (Howard). Carborundum is not available in the seventeenth century, but it will eventually be made by fusing silica sand and carbon in an electric furnace. Corundum is available from the island of Naxos, Greece, where it has been mined since ancient times. Other abrasives which are immediately available include sand and pumice dust.

It will be important to "grade" the abrasives. This will be done by first separating them, according to particle size, by meshes of progressively greater fineness, and then measuring the settlement time of the particles.

Star Testing. The old-fashioned way of determining whether the lens or mirror had the right shape was to use it to look at a star, both in focus and slightly inside and outside focus (Berry 215–20), and then try to remove any observed aberrations. This had numerous problems, including having to wait for the right observing conditions and inability to determine the magnitude and location of the defect (Texereau 60). Still, it was used by Hadley in 1722 (Thompson 11) and Texereau avers it has been used as long as telescopes have existed.

Foucault Tester. This test method was devised by Leon Foucault in 1858. It is very fortunate for us that it is described in that amateur telescope making manual at the high school. One simple Foucault tester design uses a frosted light bulb, an off-the-mirror axis light slit, a scale, and, on a slide, a knife edge and a scale indicator. The light shines through the slit and is reflected off the mirror and back to the observer, who is looking "over" the knife edge. The knife edge can be moved so as to obstruct part of the reflected light. By studying the patterns of light and shadow on the mirror, the mirror maker can determine whether the mirror surface is spherical or paraboloidal, the radius of curvature of different parts of the mirror, and the location of bumps and hollows.

Pitch lap. Howard says, "a pitch lap is simply a layer of pitch applied to the tool, smoothed to fit the surface of the mirror, and channeled to permit free circulation of air, water and polishing agents." (65).

The pitch lap, of just the right softness, is very important to properly parabolizing a mirror. Thompson (6–7) said that an attempt was made to construct a Gregorian reflector soon after its invention, "but whatever chance it may have had of performing creditably was lost by polishing the speculum on a cloth lap—putty (tin oxide) being used as the polishing agent. The unyielding lap was an insurmountable barrier to parabolizing. . . ."

The culprit was Reive, a London optician, and Bell says that his 1664 use of the (presumably customary) cloth lap was "sufficient to guarantee failure."

Likewise, Howard (79) warns that paper, silk, beeswax (honeycomb foundation), and cloth have all been used to polish mirrors, but all are "relatively unyielding" and have "a tendency to produce a 'lemon-peel' surface on the mirror." Texereau (46) takes a somewhat more judicious view; he agrees that the cloth lap ("widely used in making spectacle lenses and various inexpensive optics") is unacceptable, but admits that Foucault and the Henry brothers obtained good surfaces with paper laps.

Newton said, in *Opticks* (1704), that he used a pitch lap, and putty, to polish his specula (Thompson 10). These, of course, were metal mirrors, not glass.

While ATM no doubt talks about the proper characteristics of the pitch lap, in the seventeenth century there is precious little quality control (and frequent adulteration), and the pitch will have to be tested for suitability.

Silvering. Methods are given in ATM. Also, the basic silvering reaction is a favorite for chemistry demonstrations, and the Summerlin book is in the high school.

Making Glass Lenses

Our first problem is obtaining good optical glass. Bell (50) says, "the purity of the materials is of the utmost importance . . . The silica is usually introduced in the form of the purest of white sand carrying only a few hundredths of one percent of impurities. . . ." The glassmakers of the seventeenth century simply did not work at this level of purity and neither did their suppliers. The glassmakers can accept, even pursue, the tints offered by iron (green), manganese (pink), etc., but these are undesirable in a lens.

As the components of the glass melt are mixed together, they react, which results in the formation of bubbles. It was not until 1805 that Pierre Louis Guinand discovered that replacing the wooden stirring rods with ones made of fire clay served to bring the bubbles to the surface, much improving the result. It is fortunate that this secret is divulged by EB11 "Glass." Until the time of Guinand, the largest flint glass discs which could be cast without unacceptable flaws were 2–3 inches (Doherty 16).

Striae (thread-like inclusions) form as the result of evaporation of glass components during melting. Like bubbles, they are left in the glass by incomplete stirring.

Optical glass tends to be required in thicker pieces than the glass used for windows and mirrors. For the purpose of lens making, it is probably best for glass to be formulated in relatively small clay pots (perhaps half ton capacity), with heating and cooling tightly controlled.

After cooling, the glass must be examined for flaws (bubbles, striae, chips, cracks, etc.). One trick which will probably be rediscovered is to put the block of glass into an aquarium-like receptacle and fill this with a liquid of the same refractive index as the glass. This eliminates reflection and refraction at the surface making it possible to see flaws deep inside. Typically, in the early 1900s, not more than half, and often much less than a quarter, of the glass would pass this inspection, and of course attempts were made to cut out suitable fragments.

Candidate lens blanks can be further examined for bubbles and striae, and sometimes these can be worked out. Bell estimates that the price of lens blanks increases as the cube of the diameter.

The starting point for creating a lens is a rough disk or spheroid of glass. In the early seventeenth century, the lenses were ground using a "primitive hand operated lathe," and the lens surface compared with that of a metal template. One of Galileo's lensmakers, Ippolito Francini, had a lathe with a pivoted boring bar, and a flywheel to maintain a constant rotation speed. The lathe could be used to grind the lens directly, or it could be used to make a metal lap, with which the lens was subsequently hand-ground. (Woods).

In 1652, when Huyghens tried his hand at lens grinding, he had to ask an expert how to make the grinding mold, what sand to use, and so forth. There were no books to teach the art. However, the craftsman did not hold the art an absolute secret; Isaac Beekman learned the techniques in 1632 from Johannes Sachariassen; and Huyghens was tutored by Gutschoven. (Dijksterhuis 57).

Finding good lenses is not going to be easy. In 1616, Giovan Francesco Sagredo complained to Galileo that "out of a lot of 300 lenses he had purchased for Galileo from Venetian glass maker Maestro Antonio only three proved suitable for use in his telescopes." (Pope) I suspect that some of the lenses rejected by Galileo got palmed off on those whose interest in astronomy was obviously casual (the telescope as "room decor").

Reviewing descriptions (Medicean Skies) of mid-seventeenth century lenses, I find:

20:-50 (20 mm aperture, -50 mm focal length) eyepiece: "a very slight green tint and some spherical bubbles"

?:1022mm objective: "many small bubbles and inclusions as well as a slight yellow tint"

70:3600 objective: "slight red colouring . . . numerous small bubbles of elliptical form."

84:6050 objective: "red tint . . . elliptical bubbles and some inclusions".

40:1480 objective: "red tint . . . elliptical bubbles and some inclusions".

25:-64 eyepiece: "clear . . . a number of aligned elliptical bubbles".

26:-140 eyepiece: "good transparency . . . some elliptical bubbles".

27:-84 eyepiece: "slight green tint . . . elliptical bubbles."

111:111.6? objective: "reddish tint . . . some bubbles."

35:-67 eyepiece: "slight green tint . . . some small bubbles."

35:-94 eyepiece: "slight yellow tint . . . some bubbles and inclusions."

Even at the end of the nineteenth century, there were still problems with making big lenses. The 1911 "Telescope" article says, "the difficulty of procuring disks of glass (especially of flint glass) of suitable purity and homogeneity limited the dimensions of the achromatic telescope. It was in vain that the French Academy of Sciences offered prizes for perfect disks of optical flint glass. Some of the best chemists and most enterprising glass-manufacturers exerted their utmost efforts without succeeding in producing perfect disks of more than 31 in. in diameter. All the large disks were crossed by striae, or were otherwise deficient in the necessary homogeneity and purity."

Making Metal Mirrors

It is not very likely that any of the up-time books on telescope making will teach this lost art. Of course, down-time metalworkers know how to proceed. Indeed, it is perhaps no accident that one of the great telescope designers, Sieur Guillaume Cassegrain, was a sculptor who worked in bronze.

In *Pirotechnica* (1540), Vannuccio Biringuccio describes (388–390) how to cast and polish a metal mirror. According to Biringuccio, the ancient method was to make them of the same alloy used for bells; 75% copper and 25% tin (optionally adding 1/18th antimony or 1/24th silver). However, in his time, he says, most of the masters reversed the proportions, that is, their mirrors were 25% copper and 75% tin.

In any event, to make a flat mirror, they melted the alloy and poured the molten metal into a mold, typically three dita (inches) thick. The metal piece is removed from the mold and fastened to a board with plaster of Paris, pitch or glue. Next, the metal is polished, using a millstone, or sand and water. Biringuccio warns the reader not to "continue to rub long in one direction."

Scratches made by the coarse materials are removed with very fine emery or powdered pumice, placed on a woolen cloth. Then the mirror is dusted with "Tripoli," ochre, or "calcined tin," and rubbed some more. Finally, the mirror is detached from the board and framed.

The manufacture of a concave mirror is similar, but one starts with a concave mold, and the mirror is polished while still in the mold, which is turned on an axle like a potter's wheel.¹

The 1911EB gives the preferred "speculum metal" composition, 4 parts copper to one part tin (or by weight, 252 copper: 117.8 tin). Note that this is different from the "modern" mirror composition recommended by Biringuccio. It also comments, "Shaping, polishing and figuring of specula are accomplished by methods and tools very similar to those employed in the construction of lenses. The reflecting surface is first ground to a spherical form, the parabolic figure being given in the final process by regulating the size of the pitch squares and the stroke of the polishing machine."

Thompson (13) provides some details on eighteenth century practice. First, the disks were cast in approximately the desired curve, to minimize the amount of subsequent grinding and polishing (speculum metal was notoriously difficult to work). The grinding was done with a convex iron tool, and emery or sand as the abrasive. The polishing was with a pitch lap, and rouge.

In view of the tendency of speculum metal to tarnish, it might be wise to take a piece of modern window glass and use it to close off the "business end" of the reflector (Texereau 189).

Improvisations



Eyeglasses. Could the eyeglasses of deceased Grantville residents be recycled for use in telescopes? Obviously, eyeglass lenses are typically singlets, not achromatic doublets. But we are comparing them, for now, not with even Doland's lenses, but with those available in the early seventeenth century. By down-time standards, they're marvelously clear.

About 80% of eyeglass lenses are plastic, and the remainder are glass. Plastic lens can be impact-resistant polycarbonate, "CR39," or a "High Index" plastic.

A telescope lens is likely to be larger, thicker, and more accurately ground than one for eyeglasses. (MadeHow).

The first impediment to the recycling of eyeglasses for astronomical use is their small size. I haven't found any statistics, but the effective diameter of ophthalmic lenses (that is, the longest line from edge to edge, and thus the minimum diameter of the original lens blank) seems to run 40-75 mm. If the lens isn't circular, then when the lens is cut down to circular for telescope use, it will be narrower. For example, my eyeglasses have an effective diameter of 50 mm and a height of only 38 mm. That is not much of an improvement on the Galilean lenses.

Another issue is focal length. Pope says "a sharply curved eyeglass lens is not expected to perform as well as one of flatter shape." All else being equal, the more sharply curved the glass, the shorter its focal length.

To minimize spherical and chromatic aberration (and with singlet lenses, you worry about both) you would want to use a high f-ratio. And that usually means a relatively high focal length. Even with modern

refractors, a typical ratio is 15:1 ("f/15"). Thus, if you were using a 50mm diameter eyeglass lens as the objective, the desired focal length would be 750mm.

Unfortunately, you are probably going to have a hard time finding that long a focal length in an eyeglass. Opticians don't usually talk about focal length; they refer instead to refractive power, measured in Diopters. The focal length is the reciprocal of the refractive power, so a 2.0D lens has a 500 mm focal length. And you would need a 1.33D lens to get 750 mm.

Myopia (short-sightedness) is corrected with a concave (negative) lens and hyperopia with a convex (positive) lens. (Bear in mind that concave and convex are relative to the light source, so you can convert a negative lens into a positive one by flipping it.)

Low myopia is 0-3D, medium is 3-6D, and high is 6 or worse. Among Americans at least forty years old, 25.4% are 1D or worse, and 4.5% 5D or worse. The milder the myopia, the less likely it is to be corrected. A 3D lens would have a focal length of only 333 mm.

Hyperopia usually isn't corrected unless it is at least 3D. Among the same population, 9.9% had hyperopia of 3D or greater. (Kempen)

A myopic patient may also have astigmatism, and if the lens corrects for the latter, it isn't going to be useful for astronomy because it will then *introduce* astigmatism.

All in all, it looks like prescription eyeglass lenses are likely to prove too small and too short in focal length to be useful as objectives—even in competition with seventeenth-century lenses.

Curiously, the most useful eyeglasses are probably those cheap 1-3 diopter reading glasses you can buy in a drugstore. People in their forties might want one diopter glasses, and as they age, the required goes up about 0.5 diopter per decade (Duenwald). A one diopter 50 mm eyeglass would provide a nice f/20 objective, albeit a rather small one.

Eyeglass diameter is not a problem for eyepieces. Unfortunately, focal length is. If a refractor had an objective with a focal length of 1000 mm, then a 3D eyepiece (333 mm) would yield a magnification of only 3x. To match the maximum magnification of Galileo's scopes (30x), you would need to couple that eyepiece to an objective with a focal length of 10,000 mm—over thirty feet! You could keep the objective at 1000 mm if you could find an eyeglass which was just 33 mm focal length—but that would correspond to a refractive power of 30D!

Fixing up Department Store Telescopes. In general, the worst parts on these scopes are the eyepieces (mostly plastic, narrow field of view, poor eye relief, non-standard barrels, and a low focal length chosen to provide absurdly high magnification) the mounts ("sag city"), and the finder scope. So the key is to replace the eyepiece, mount and finder scope with something better (Portuesi, Trott).

The eyepiece is the trickiest part to fix. Trott suggests salvaging the eyepieces from an inexpensive or broken pair of binoculars. He warns that these have to be prism style binoculars ("Z" shape); the straight binoculars are Galilean refractors.

Telescope Prices

James Short, in the late eighteenth century (multiply by 0.8 for 1632 equivalent), had a catalogue offering his Gregorian and Newtonian telescopes for sale. Here are his Gregorian prices:

Diameter (in.)	Focal length (in)	Magnification	Price (guineas = 21 shilling)
1.1	3	18	3
1.9	7	40	6
4.5	24	90-300	35
6.3	36	100-400	75
18	144	300-1,200	800

(Thompson, 14)

Herschel borrowed a 4.5 incher, but couldn't afford to buy one. That led him to teach himself the arcane art of telescope making. He started with refractors and, finding that too difficult, turned to reflectors (Bell 32). Eventually, he sold his own scopes, a 6.5 inch reflector for 100 guineas and an 8.8 inch for 200-300.

Dolland, in the mid-eighteenth century (prices within 10% of 1632) sold a refractor with a two inch achromatic objective, and 24 inch focal length, for 2 guineas. One with a simple objective sold for about one-sixth the price.

(See Thompson 14-18.)

Practical Use of Astronomical Telescopes

In the introduction, I discussed the philosophical value of the telescope as a tool for convincing the intelligentsia of Europe to accept the teachings of twentieth-century science. But the telescopes, especially with up-time inspired improvements, are of some immediate practical value.

Telescopes can be used to accurately map the heavens, with benefits for those traveling long distances by land, sea or air.

While some up-time star position information is available, it is anachronistic because of almost four centuries of precession. In "Soundings and Sextants," I expressed the opinion that the late-sixteenth century Tycho Brahe data for the northern hemisphere stars would be more useful in 163x than "back-precessed" data from the typical twentieth century "star guide." (If astronomy software with a good precession algorithms are available to the up-timers, then I will have to retract that statement.) In any event, there will be a demand for "current" star positions determined with the precision which up-time inspired telescope designs would make possible. That is especially true for southern hemisphere stars, which are poorly covered by Brahe.

In addition, the telescope can be used to determine the "current" (163x) orbital elements of the moon and planets, and thus to predict the future positions of these celestial bodies.

And of course the Sun, too.

Thus, the telescope will facilitate the creation of accurate ephemerides, and hence lead to improvements in the art of navigation.

When traveling, we need to know not only where we are, but also where we are going. The telescope will play an important role in mapping. It is true that the latitudes and longitudes of many locations will be deducible from up-time maps, by interpolation between the drawn latitude and longitude lines. The accuracy of the interpolation will be dependent on the scale of the map, and on the accuracy of the tool used to measure the distance between the location and the nearest line. For example, the grid for the Hammond Citation Atlas map of Germany uses lines which are two degrees apart. We can probably determine latitude and longitude of the locations shown on this map with an accuracy of a few arc-minutes.

To achieve greater accuracy, or to determine the latitude or longitude of unmapped locations, we will need to make telescopic observations.

For example, the telescope can also be used, at least on land, to observe the moons of Jupiter. The changing orientations of the moons provides a reference time which, when compared with the local time indicated by the movement of the Sun, yields the longitude of the point of observation.

Telescopes can also be put to terrestrial use, such as surveying, communications (reading flag or light signals), and navigation (seeing landmarks or hazards). Of course, for these purposes, you need an erect image, such as that offered by the Galilean refractor (which is why that design persists in opera glasses) or the Cassegrain reflector. The inverted image of the Kepler refractor or Newtonian reflector can be reverted by a lens or mirror, but at the cost of additional light loss.

Conclusion



I have not yet commented on the social value of the telescope, as a tool for increasing interest in science. For the Florentine court, Galileo was as much an entertainer as a scientist; he gave telescope demonstrations at parties. Herschel, after discovering Uranus, got treatment similar to that of a modern rock star. Many of the seventeenth- and eighteenth-century intelligentsia dabbled in astronomy (Bell 19).

In 1584, Giordano Bruno wrote, "God is infinite, so His universe must be too. Thus is the excellence of God magnified and the greatness of His kingdom made manifest: He is glorified not in one but countless suns; not in a single world but in a thousand thousand I say in an infinity of worlds."

Telescopes show us a myriad of stars and other wonders which are not visible to the naked eye.

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Unintended Consequences: Dealing with the Population Density Explosion

Written by Walt Boyes



The reconstruction of Magdeburg brings to mind issues in population density. Although relatively large cities existed in 1634 in OTL, none of them qualifies as a really modern city, as the up-timers would recognize them. The up-timers will cause an unparalleled population density explosion, based on the technologies and the social systems that were developed in the late nineteenth and in the twentieth centuries to handle the growth of the megalopolis.

None of the large cities of Europe or Asia qualified as metropolitan until nearly the end of the nineteenth century. Why? To handle large scale urban populations of the density of even a twenty-first-century Hamburg, you require a combination of the effects of the development of five things. You need the germ theory of disease and epidemiology, centrifugal pumps and the associated high pressure piping, electricity, and the modern safety elevator. What, you say? They had pumps, they had running water . . . All that's true, but this is a synergism. You need *all* of them to make a modern metropolis work.

So, what's a large, modern city? Here are the 2007 top five:



By Population

- 1 Tokyo/Yokohama Japan 33,200,000
- 2 New York Metro USA 17,800,000
- 3 Sao Paulo Brazil 17,700,000
- 4 Seoul/Inchon South Korea 17,500,000
- 5 Mexico City Mexico 17,400,000

Now, contrast this with what passed for a large city in the seventeenth century. The two largest cities in the world were Beijing and Constantinople, both with roughly 700,000 people. Edo, Japan, the core of modern Tokyo, had roughly 575,000 people. London and Paris were the largest cities in Europe, with close to a half million people each, while Naples had 300,000 and Amsterdam had 200,000.

In order to cram 33 million souls into 6,993 square kilometers, as Tokyo does, or close to 18 million into 8,683 square kilometers, you have to build high. Tokyo and New York are both in the top five of cities with the most skyscrapers.

Epidemiology

You need a clear understanding of the germ theory of disease, especially for waterborne illnesses. It is arguable whether cholera existed in northern Germany in 1630 but it would not be long before it came there. It was the understanding of how cholera is transmitted that created the discipline of epidemiology, and led directly to the concept of making drinking water safe. This didn't happen until Dr. John Snow, who appears to have singlehandedly created the modern science of epidemiology, and his friend, the Rev. Henry Whitehead, determined the importance of the Broad Street Pump to the London Cholera Epidemic of 1854. Granted, Whitehead and Snow didn't understand the germ theory of disease, but their work pointed to it and it provided the final key in the lock of safety from disease.

At the time, London had the highest population density on record, more than two million people in a ten mile circumference. But what was true for London in 1854 had been true for every large population center in history.



Cities had sewers. Cities had water companies. Some cities had running water in some wealthier dwellings, and some even had flush toilets. What they did not have was a clear understanding of how to ensure that the water supply was drinkable, because they didn't understand the link between water-borne bacteria and disease.

Cities generally obtained their water supplies from either surface water (rivers, lakes, and stormwater catchments) or ground water, or a combination of the two. Water intakes were, as often as not, downstream from wastewater discharges since there was no understanding of water-borne pathogens. Groundwater supplies tended to be shallow subsurface wells, since drilling deep water wells was not yet technically practical, and would not be until deep drilling techniques became powered by steam. These "groundwater supplies" were actually easily contaminated by surface pollution, as the story of the Broad Street Pump describes.

Getting the water from its sources to the population was not trivial, either. Modern cities are built over a grid of water pipes that is divided into pressure zones. Pumps and elevated storage are used to maintain relatively

constant pressure in all the pipes in each zone. In some cases, it required the development of cast iron pipe and high pressure pumps to produce high enough pressure to feed all the parts of the grid.

Getting wastewater away from its sources was also non-trivial. Ranging from simply putting the contents of the chamberpot in the basement (England) to opening the window and splashing it out into the street (in France and Scotland "gardy-loo" or *garde l'eau* was the traditional cry given just before the toss) to saving it for collection and re-sale to the dyers and tanners (Germany, the Low Countries, and Italy) there was virtually no organized attempt to collect and remove wastewater, and treat it before it returned to the surface water and ground water supplies.

The 1632verse is different. Grantville appeared, complete with physicians, nurses, medicines, textbooks, and a public health praxis that the Early Modern Europeans could see working.

Grantville's largest impact in its first few years of existence in Thuringia will be the dissemination of modern public health practices—not modern medicine. Simple adherence to the basics of modern public health as the up-timers knew them (especially regularly washing hands with soap) will have a huge impact on reducing infant mortality, lengthening lifespan, and reducing death from disease. And, since no good deed goes unpunished, this will, of course, lead directly to a population explosion.

More and more people, living in close proximity, eating and excreting . . . a breeding ground for cholera, typhoid, and other water borne diseases.

Disinfection

The second thing you need is a practical means of disinfection for both water and wastewater. This means: easy to produce, understand, and maintain. In addition, you need to have the ability to make sure that any given amount of water *is* drinkable and safe.

This didn't occur in OTL until after John Snow and Henry Whitehead proved that cholera (and by extension, other diseases) was caused by contamination of water by human feces. Shortly afterward, Semmelweis, Pasteur, Lister and Koch proved that the microorganisms first being identified in the seventeenth century by microbiologists like van Leewenhoeck were the proximate cause of diseases like cholera.

Once we knew what caused cholera and typhoid, it was a quick step to find a means to destroy the enemy bacteria.

In 1913, a typhoid epidemic struck Northern New Jersey, and the source was identified as a stream feeding into a reservoir in Boonton that was the water supply for Jersey City. Charles Wallace and Martin Tiernan finally found a way to inject measured amounts of chlorine gas into the water in a repeatable way, providing the first reliable means of disinfection of a public water supply. Chlorine, in either gaseous form or in the form of sodium or calcium hypochlorite, had been tried previously, but too little chlorine has no effect, and too much chlorine in the water produces diarrhea and vomiting in victims. Wallace and Tiernan made it possible to accurately meter chlorine into the water supply. Why chlorine? Chlorine carries a *residual* which means that you can be sure that the water in which chlorine is present is disinfected. And this residual is easy to measure.



Grantville came through the Ring of Fire with three working disinfection systems: the power plant's cooling water system, the city water treatment plant, and the city wastewater treatment plant. The engineering library at the water plant and the public works department and the wastewater treatment plant had multiple copies of *Standard Methods for the Examination of Water and Wastewater*, the treatment and testing bible of late-twentieth-century water treatment as well as copies of *The Manual of Practice for the Disinfection of Wastewater* and *Chlorination of Water*. So they understand how to do it, and have working systems to pattern from.

It isn't enough to understand epidemiology, you also have to have the technology and tools to do something with it.

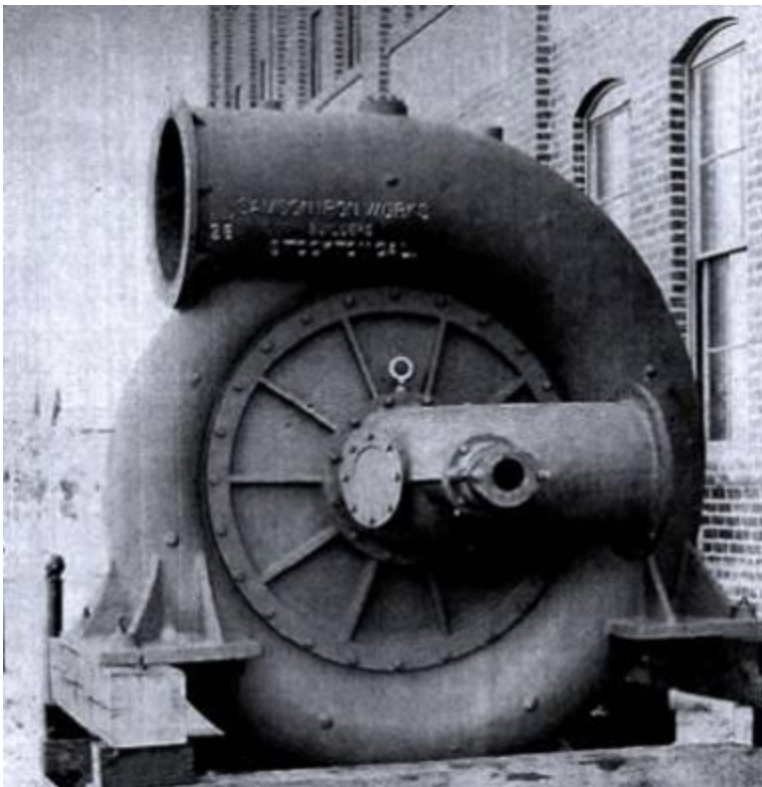
A brief mention must be made of the social response to the new theory of epidemiology and disease. Laws were passed ensuring that public urination and defecation were forbidden. Renewed importance was given to bathing and general cleanliness, especially after Nightingale, Lister and Koch proved that disinfection lowered mortality rates in hospitals by orders of magnitude. As it will in the 1632verse, simply making the washing of hands

a socially-important behavior will do more to increase population growth than almost any other thing.

Centrifugal Pumps

There are two reasons why buildings in large cities throughout history have been low rises. One is the fact that climbing stairs is a real pain after about five or six floors, and the other is that it just isn't possible to use a positive displacement pump (think the well pump from the Old West farmyard, or the infamous Broad Street Pump) to pump water higher than about twenty-two feet in the air. Buildings with floors higher than this had no water on the upper floors, and were unpleasant to live in, as well as being serious fire hazards, since the fire department couldn't get water up there either, if there even was a fire department.

Luckily, in the middle-seventeenth century, OTL, inventors in England, Holland and Germany came up with a mechanism for moving large amounts of water that could pump very high pressures. It was called the centrifugal pump.



This kind of pump has a rotor with curved blades on a solid backplane. This is called an impeller. The impeller sits inside a narrow casing inline

with the casing's inlet and outlet. The outlet of the casing is smaller than the inlet. The impeller turns at a relatively high rate of speed (needs an engine or motor to do that) and causes a slight suction that pulls water into the casing chamber or "pump bowl" and forces the water out the outlet at a high rate of speed and pressure. A refinement of the principle, the turbine pump, has straight vanes, and both impeller and turbine pumps can be staged, with the output of one chamber or bowl feeding the next, and so on. Deep well turbine pumps are often designed with many multiple stages. Six to ten stages are common for a deep water well.

Depending on the design of the centrifugal pump, water can be pumped at very high pressures. An outlet pressure of 100 psi, for example, would allow the water to rise 220 feet in the air. This might serve a building approximately twenty-two stories tall.

The earliest centrifugal pumps were made of wrought iron, with wooden bearings and in some cases, wooden shafts. Seventeenth-century metallurgy had not yet produced the high pressure piping necessary. Cast iron pipe for larger diameters than about two inches, brass and copper for smaller diameters, needed to be developed in order to fully utilize the kinds of pressures centrifugal pumps could produce. Metal tanks that could be pressurized and used as surge, or hydropneumatic tanks also needed high pressure metallurgy.

Grantville brought dozens of working centrifugal pumps to the 1632verse. Reverse engineering them will be nearly instantaneous, especially since the principle of centrifugal pumping was already beginning to be used.

Until the metallurgy of the 1632verse catches up to the twentieth century, we'll have to be careful of building pumps that are too high pressure for the pipe they are connected to. In OTL, what early modern "skyscrapers" did was to position water tanks in stages, and pump water from a lower tank into a higher one, until finally the water reached the tank mounted on the building's roof. Water pressure was maintained in this tank, to feed all the taps in the building. The citizens of Magdeburg and other large cities will do the same thing.

The Safety Elevator

One of the first things that happens in an urban population explosion is that it becomes much more efficient to build up, rather than out. Cities as old as Republican Rome had relatively tall (perhaps as high as seven stories) buildings, but the upper floors were undesirable, because there was no water supply, no easy way to get water there, and no way to bring your stuff up, except by the stairs.

Elevators have been known and used since ancient times, but they were clumsy, slow, hard to power, and extremely unsafe. Elisha Otis' patent 31,128 was the other thing that made high rise domiciles possible. In 1854, his invention of the elevator safety brake was revealed at the Crystal Palace Exposition in New York. The brake made it possible to stop an elevator in just a few inches if the lifting cables broke. High pressure pipe and high pressure-capable steel vessels made high pressure steam engines practical, which in turn made cable operated elevators with safety brakes a simple means of moving people and goods in a vertical direction. This made easy access to upper floors on a high rise building practical.

Here again, the 1632verse will differ markedly from the OTL. They start with working safety elevators, and an understanding of how they work, and why they are necessary.

One of the up-timers, Howell Tillman, and his apprentice and partner, Laura Beth Trimble, has started an elevator repair, maintenance, and design firm called Howard Tillman and Associates. Duplicating Grantville's few modern elevators will be in substantial demand as soon as Magdeburg finds that it is necessary to go up rather than out as population grows.



Early modern elevators also only went up a few floors. Then you had to get off at an elevator landing and take another elevator to higher floors. This was because of the weight of the cable needed to make an elevator that would go more than six or eight floors. As 1632verse technology improves the manufacture of woven wire cable, elevator technology will also improve, and elevators will be used for higher and higher buildings.

Smaller and easier to run electric motors will also improve the elevator. If you need a steam powered donkey engine in the basement to run the elevator, you can't run it up very many floors. But if the motor is small enough in size and weight that it could be mounted on the roof, or on an intermediate floor, the possibilities for expansion are endless.

Why were electric motors necessary? Once you install an electric motor, and give it a power supply and turn it on, it will continue to operate

unattended until the power supply is interrupted, either by power failure, or when you turn the motor off. It has a very small footprint per unit energy produced. Contrast this with a small high pressure steam engine, of the kind known as a "donkey engine." This engine requires a source of water, a way to vent steam, a smokestack, a source of fuel (usually coal) which must have storage, replenishment, and cleanup, and an engineer or suite of engineers, who attend the engine during its operational life.

The other important development that will make elevators useful in handling high density populations is signaling. It is necessary to let the elevator operator (early elevators would have human operators, instead of automatic controls) know what floor needs the elevator. Simple electromechanical signals are only available if the building has electric power.

Electricity

The final piece in our synergistic puzzle was not just the discovery of electricity, but the ability to deliver it in a grid pattern anywhere people wanted to use it to do work. Widespread availability of cheap power in the form of electricity is the engine that powers the modern metropolis.

Electricity makes practical things that twentieth century OTL citizens take for granted: fresh meat, fresh vegetables, frozen foods, climate control in buildings, effective and safe lighting in buildings and streets, and powers the communications media from the telegraph and telephone to HDTV and the Internet.

A significant population limiter that electricity and the development of powered refrigeration eliminated was the need for the city to be located within one day's shipping time from the sources of fresh food. Meat, poultry, milk, butter, eggs, greens, all had to be produced in the immediate outskirts of the city. This limited the geographical area into which the population could expand, while the lack of electricity also limited the vertical geographic expansion as well. The lack of electricity meant that the largest non-electrified city in history, nineteenth-century London, had a population of around 2 million at most.

Electricity makes lighting, heating, powering elevators and pumps practical in high volume. This eliminates the height restrictions on population expansion. Electricity allows both for local storage of refrigerated goods, but also the shipping of refrigerated goods in trucks and railcars.

In addition, electrical controls and signaling are much more efficient and easy to produce and maintain than mechanical or pneumatic controls and signal lines. The development of electrically powered motors, switches, relays, and other controls made the development of the modern factory practical, which in turn allowed for more employment in the city, which, in its turn, encouraged population growth.



Like the OTL, the form power distribution will likely take will be AC or alternating current. As nineteenth-century utilities found, distributing alternating current is easier, simpler, cheaper than trying to distribute DC, direct current, power. Why not build local building generators? Why centralize the production of generated electricity? First, if each building has its own power generator, it must also have in multiplicate the logistics necessary for serving that generator, including fuel, fuel storage, fuel delivery, operations and maintenance and engineering crews, and the generator will take up space that as population density grows, will become more expensive. Contrast this with a central power generating station which only needs a single logistics train, and which can, in the case of hydroelectric generating stations, be located considerable distances away from the city itself.

One of the things to be explored in the 1632verse is whether DC power will be used within highrise buildings, or whether, as in the OTL, AC will

be served directly to the appliance.

These are the five things, working together, that the 1632verse has from the very beginning, that the OTL took from 1600 to 1920 to develop. Working together, they will permit the rise of the modern urban metropolis in 1634, rather than waiting until 1900.

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THE END

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