

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' Webscriptions](#) 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 Webscriptions 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

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The Anaconda Project, Episode Four

Written by Eric Flint



Krzysztof Opalinski was obviously puzzled by Morris' reference to himself as Gandalf. But, to Melissa's surprise, his companion Jakub Zaborowsky grinned.

"Not exactly, Herr Roth—at least, not from our viewpoint. You are more in the way of our Elrond. Perhaps Galadriel."

Morris gaped at him. Jakub made a modest wagging gesture with his hand. "I like to read. Although I must say that while I enjoyed *The Lord of the Rings*, the premises are absurd. In that story, everybody loves the king except the forces of evil—and there are no rapacious great noblemen to be found anywhere. A fantasy, indeed."

Morris was still gaping at him.

"Close your mouth, dear," murmured Judith. She gave Zaborowsky a smile. "I'll admit the image of my husband as an elf is delightful, but . . . I don't really understand what you mean by it."

Jakub shrugged. "It is not complicated, really. Gandalf was the leader of the active struggle against Sauron. In Poland and Lithuania, at least—and certainly in the lands controlled by the Cossacks—Herr Roth cannot possibly play that role. The Poles are a fractious people, and the Lithuanians even more so. But if Wallenstein makes the mistake of trying to encroach upon their territory, they will unite against him. And they will have Hetman Koniecpolski leading their armies. He is not a general any sane person takes lightly."

Morris had closed his mouth, by now. "Well. No, he isn't."

"To put it mildly," said Melissa. Stanislaw Koniecpolski had pretty much fought the Swedes to a stalemate from 1626 to 1629, after they invaded Polish territory. In the end, Gustav Adolf had decided it would be smarter to sign a treaty than continue the fighting. "I have never been in such a bath," had been his comment after the final battle of the war near Trzciana, which was for all practical purposes a Polish victory. Stanislaw Koniecpolski could say that he had defeated Gustav Adolf in battle, a claim which precious few other men could make, if any.

It helped salve Gustav Adolf's pride, of course, that the ensuing Truce of Altmärk was mostly in Sweden's favor. As was usually the case, Poland's strength on the battlefield was not matched by

equivalent political cohesion. Koniecpolski himself was reported to have opposed the truce—but he'd been sent to the Ukraine to deal with a Cossack uprising.

For the past year and a half, the hetman had been fighting the Ottoman Turks. Again, Koniecpolski's ferocious skills on the battlefield had driven his opponent to seek a treaty. It has just been signed in September.

"As for the Cossacks," Zaborowsky continued, giving his companion Fedorovych a little nod that seemed half-amused and half-respectful, "I am afraid you cannot take Dmytro here as a valid sample of the lot. He has no animus against Jews at all, so far as I can tell. Not so, for the average Cossack. Even Jewish traders are at some risk in Cossack territory."

Naturally, that set Morris back to glaring. At the wall, however, since he couldn't very well glare at the only Cossack actually present.

Seeing the nod in his direction, Fedorovych asked for a translation. Once he got it, he grunted. Then, jabbered something that had to be translated back.

"What he says," explained Zaborowsky, "is that I am exaggerating some. Most Cossacks have no contact with the Jews in the towns and their villages. All they see are the Jewish rent-collectors and estate managers that exploit the Ruthenian peasants. So they take those as representative of the lot, when in fact they are a small portion. Dmytro's been in the towns, and he knows that most Jews are just as poor as most peasants."

Having finished, he shrugged again. "What is says is true enough. But Dmytro is such a good Christian under the Cossack bandit exterior—you understand, I am being very generous with the term 'Christian'—that I think he underestimates the force of sheer bigotry. Especially when it is reinforced weekly, sometimes daily, by priests of the Greek faith."

Melissa couldn't help but make a face. "The Greek faith" referred to Orthodox Christianity, which, in this day and age, was lagging centuries behind both the Catholics and the Protestants. Where the Roman church and any one of the major Protestant denominations could boast many accomplished and sophisticated theologians, the Orthodox church could count none. Where they were all vibrantly independent churches, even if they often had to tack and veer to deal with powerful secular rulers, the highest Orthodox prelates were under the thumb of either Istanbul or Moscow.

So, it was a church that relied almost entirely on ritual and custom. Good enough, perhaps, for the illiterate or semi-literate peasants of eastern Europe, and the Cossacks. But it had lost the allegiance of the native ruling classes of the vast Ruthenian lands. For all practical purposes, they had been Polonized. Ethnically still Ruthenian, they spoke Polish and practiced Catholicism or, in some cases, Protestantism. Very few of them even dwelt any longer on their Ruthenian estates. They left those to be managed by overseers—often Jewish—while they moved to Warsaw and Krakow and lived in city mansions. The last of the great Ruthenian magnates still of Orthodox faith, Prince Wladyslaw Dominik Zalaswski—perhaps the richest lord in the entire Commonwealth—had converted to Catholicism in the summer of 1632.

The end result was a "Commonwealth of Both Nations" that was actually a commonwealth of *three* nations—but the third nation, the Ruthenians, had no voice or say in the affairs of state.

Nor did the Poles and Lithuanians bother to be polite about the matter. Just two years earlier, a Cossack delegation had shown up at the electoral convention which chose Wladislaw IV as the successor to the Polish-Lithuanian throne, following the death of his father Zygmunt III. They claimed the right to

participate in the convention, pointing to their frequent and valiant role in Poland's battles with the Turks and Tatars as their credentials.

The response had been blunt, and as rude as you could ask for. It was explained to the Ukrainian roughnecks that, yes, they were indeed part of the Commonwealth's body—just as nails are part of the human body, and need to be trimmed from time to time. And they were not welcome in the convention. Leaving aside the arrogance and bigotry involved, it was hard for Melissa to imagine anything more stupid on the part of Poland and Lithuania's rulers. Bad enough, that they treated their Ruthenian serfs like animals. But to do so when those serfs had living among them a large and ferocious warrior caste like the Cossacks . . .



They were practically begging for a social explosion, and, sure enough, it was on the horizon. In the universe she'd come from, the situation had finally erupted in the great Cossack revolt of 1648, led by the Cossack ataman Bohdan Chmielnicki. The revolt had shaken the Commonwealth to its foundations, leaving it wide open to the foreign invasions that would devastate Poland and go down in its history as "The Deluge." And, in the end, Poland would lose the Ukraine to Moscow. And with that loss, the power equation between the two great Slavic nations would shift drastically in favor of the Russians.

Morris was muttering something. She thought it was "I knew it."

"Stop muttering, husband," said Judith. "Say it out loud, if you have to say it."

"I knew it," he pronounced.

Krzysztof Opalinski frowned. "Knew what?"

Zaborowsky, whom Melissa had already pegged as the brighter of the two Polish radicals, gave him a sideways glance. "He means 'I knew the Cossacks would be useless. Probably enemies.'"

Fedorovych demanded a translation. Jakub gave it to him, and from the brevity Melissa was sure he

pulled no punches. But instead of matching Morris' glare with one of his own, the Cossack just grinned. He jabbered something. Jakub translated.

"He says he didn't mean to suggest anything would be easy. With Cossacks, nothing is easy. He says you should watch them quarreling over the loot. Worse than Jews in a haggling fury."

Morris looked to the ceiling. "Oh, swell."

* * *

Later that night, after they retired to their chamber—chambers, rather—James Nichols gave their surroundings another admiring whistle. Then, eyed the bed a bit dubiously, and the canopy over it more dubiously still.

"You realize that if that thing comes down and buries us, we'll smother to death. Damn thing must weigh half a ton."

"Oh, don't be silly," said Melissa. But her own gaze at the canopy was probably on the dubious side, also. The thing wasn't really a "canopy" such as you might find over a bed in a fancy hotel. It bore a closer resemblance to the unicorn tapestries she'd once seen at The Cloisters museum in New York. It certainly didn't weigh half a ton. That was just ridiculous. Still, it wouldn't be a lot of fun to wriggle out from under if it did come down.

Not that that was likely to happen, of course. The four corner posters holding it up didn't bear much resemblance to anything you'd see in a fancy hotel either. They looked more like floor beams, except they were ornately carved.

There came a soft knock at the door of the entrance salon they'd closed behind them. James turned and gave it a frown. The door was visible through the wide entryway connecting the salon with the bedchamber.

"Who . . . ?"

Melissa was already moving through the entryway toward the door. "That'll be Red, I imagine. At least, if I interpreted a look he gave me at the end of the meal correctly."

"Why would . . ."

Melissa paused at the door. As thick as it was, she wasn't worried about anyone standing outside hearing their conversation.

"Why? Because, knowing Red, I'm sure there are things he's not prepared to ask or say in front of anybody. Especially not someone like the Roths, whom he likes personally but are for all practical purposes in Wallenstein's camp."

The frown on James' forehead faded. "Ah." Then he grinned. "You don't seriously mean to suggest that a flaming commie like Red Sybolt isn't entirely trustful of the intentions of Albrecht von Wallenstein, mercenary-captain-in-the-service-of-reaction-*par-excellance* and nowadays a crowned king in his own right?"

Melissa smiled. "Not hardly."

She opened the door. Sure enough, Red Sybolt was standing there. To her surprise, though, he was accompanied by Jakub Zaborowsky. She'd expected him to come alone.

As she ushered them into the salon, Melissa pondered that for a moment. Why Zaborowsky and not Opalinski? She was quite sure there wasn't any mistrust involved. Having spent a very long dinner in conversation, much of it with the two Poles, she felt confident she had the measure of Krzysztof

Opalinski. Allowing for the inevitable cultural variations you'd expect from the gap in time and place, Krzysztof reminded her of any number of student radicals she'd known in the 1960s. Sincere; earnest; filled with a genuine desire To Do The Right Thing. Whatever faults such people had, treachery was rarely one of them.

On the other hand . . .



As a rule, they *did* have faults. The biggest of them—which Krzysztof Opalinski certainly shared, from what she'd seen—was a tendency toward certainties. And, still worse, simplicities. Revolution was not a complex and turbulent episode in human affairs, filled with contradictions and confusion. It was spelled with a capital "R."

Such people could be trusted not to be treacherous, sure enough. But they could usually be trusted to screw up, too, sooner or later.

Red Sybolt was a different sort of person altogether. He had the same strength of convictions—probably even stronger, in fact. But he was a man in his mid-forties, born and raised in a working class family, who'd developed his opinions and his political tactics dealing with coal miners in the gritty reality of working lives. Not from speeches spouted on college campuses, or late night talk sessions. And he'd held those convictions for many years, solid as a rock, where most student radicals shaded into comfortable liberalism within a short time after leaving the ivory halls.

So. If she was right, that meant that Red thought there was a lot more substance to Zaborowsky than to his companion. Which wouldn't surprise Melissa at all, since that was her assessment also.

Those calculations didn't take more than a few seconds, by which time they were all seated in the comfortable chairs and divans in the salon.

All except James, that is. He was still standing in the entryway that connected the salon with the bedchamber.

Red flashed him a grin. "Hey, you're welcome to join us, James."

"Just a country doctor, remember?"

"Oh, cut it out." Red jabbed a thumb at Melissa. "I know damn well she'll tell you anything important, anyway. And leaving aside the 'country' bullshit, you're a black doctor from one of Chicago's ghettos, not some jerk MD who grew up in a gated community and thinks manicured lawns are a natural growth."

James smiled thinly. "True. But I spent no time at all meddling with black power ghetto politics in my

youth, neither. Went straight from honest crime into the military." He wagged a finger at the three people sitting on the couch. "This sort of revolutionist caballing and cavorting is not my forte."
"Yeah, sure. But you're not given to blind trust in the good intentions of the high and mighty, either."
Nichols' smile grew even thinner. "True again. In those days, my opinion of Lyndon Johnson and Robert McNamara was unprintable. To say nothing of my opinion of Nixon and Kissinger after they took over."
His shrug was as minimal as his smile. "You could print them today, but only because I picked up an education afterward. So, these days, I know there are alternative terms for 'lying motherfuckers.'"
After a pause, he said: "Well, okay. Why not?" And took a seat next to Melissa.

Red now looked at her. And then jabbed a thumb at Zaborowsky.

"I want to know if you agree with him. About the Ruthenians, I mean. We've been arguing about it. Well . . . maybe 'arguing' is too strong a word."

Melissa looked at Jakub. He was giving her a look that was far more placid than anything that really belonged on such a young man's face. "Placid," not in the sense of uncaring; but in the sense that he was quite willing to entertain notions that he suspected were wrong, but wasn't sure.

Impressive. Most political radicals that age were sure of everything.

"Well . . ."

She thought about the problem. It was quite a tricky one, actually.

"The thing is, Red, I think Jakub's *attitude* is the right one to take." She made a little face. "Although I'd recommend keeping the wisecracks about illiteracy and drunkenness to a minimum. The reason being, that any Polish revolutionary movement that isn't prepared to let Ruthenia go if that's what the Ruthenians want, won't be worth a damn. Sooner or later it'll most likely collapse. It's like . . ."

Red waved his hand. "Yeah, sure, I agree. That's why the UMWA banned racial discrimination at its founding convention, way back in 1880. It wasn't because white coal miners were all filled with the milk of human kindness and absent of all prejudice. Not hardly. It was because they were smart enough to know that if they didn't let black men join the union, the coal operators would use them as scabs. Some members of my family were active in the populist movement, too, way back when. I remember my grandpa telling me that what killed them was that they just couldn't deal with the race issue."

The last analogy wouldn't have occurred to Melissa, and it wasn't really that exact. But . . .

Red understood the gist of the problem perfectly well, obviously. Any revolutionary movement that demanded an end to privilege while simultaneously insisting that other privileges had to stay in place, automatically gave itself an Achilles' Heel. They *might* get anyway with it, to be sure. The American revolutionaries managed to overthrow British rule while maintaining slavery. But they had the advantage of an enemy who was overseas and preoccupied with its own affairs. Polish revolutionaries would be dealing with an enemy right in front of them, whose considerable power was not distant at all. And who, unlike the British establishment, was faced with the prospect of losing everything instead of just some far away colonies.

Jakub spoke up, for the first time since entering the room. "Here is what they would do. The leadership of the Cossacks, except perhaps the Zaporozhian Host, is not at all interested in eliminating serfdom. Their grievance is simply that the Polish and Lithuanian szlachta won't accept the Cossack starytsa as their social and political equals. But if they do so, the starytsa will be satisfied. And even stupid, stubborn Polish noblemen—even Lithuanians, who are more stupid and stubborn still—can face reality

if their backs are against the wall."

He jeered. "Besides, they wouldn't even have to carry it out. Those registered Cossack colonels and atamans are every bit as stupid. All the Poles and Lithuanians have to do is promise them they'll give them equality. And then we'll have thousands of Cossacks to deal with as well as the great magnates and their private armies. Whereas if we make clear from the beginning that we will let the Ruthenians decide their own fate, when we take the state power, we'll gain the support of many Ruthenians and the Cossacks will most likely spend all their time quarreling."

He jeered again. "They're very good at that."

The sarcastic jeer bothered Melissa a little. There was a hard edge to Jakub Zaborowsky that she hadn't detected in his companion Krzysztof. It was understandable, of course. Unlike Opalinski, who'd been born into wealth and privilege and had the relaxed cheeriness that often came with such a background, Jakub had been born into a hardscrabble szlachta family. There was no way he could have arrived at the conclusions he'd come to if, probably at a very early age, he hadn't come to loathe and detest the bigotry and narrow-mindedness he saw around him.

In most ways, in fact, that hard edge would be necessary. In the years to come, if he survived, Jakub Zaborowsky would have to deal with Polish and Lithuanian magnates who were as savage and ruthless as any rulers in history. Their standard response to rebellion was a bloodbath; treachery and double-dealing came as naturally to them as venom to a viper. No revolutionary leader who was soft and sweet could possibly defeat them.

Still, a revolution could turn very ugly, if the people leading it started crossing certain lines.

She shook her head, slightly. Such worries were very premature, after all. So far, from what she could see, the "Polish revolution" amounted to a small number of young szlachta radicals organized by an up-time labor agitator and allied only with a small sect of radical Christians and—maybe, down the road—with eastern Europe's Jewry, or at least a part of it. They were hardly on the verge of having to deal with the problems and temptations of triumph.



Red cleared his throat. "To get back to the point. Leaving all that aside—yeah, sure, I agree nobody should try to force the Ruthenians to do anything—what do you think about the rest of it? What I mean is, do *you* think Ruthenians would be better off if they were part of Wallenstein's empire in the making?" Melissa hesitated. Partly, just to ponder the question. Mostly, though, because she was feeling a little guilty. Morris Roth had asked her to come here in order to help her figure out how to do precisely that—absorb the Ruthenian lands and peoples into Bohemia's realm.

Which, she would do, and do faithfully, because *anything* was better than the situation that existed. But . . .

"Well, no, actually," she said. "Or, it'd be better to say, it depends. *If* the Poles straightened out their act, then I think the Ruthenians would probably be way better off as part of the Commonwealth than subjects of Wallenstein."

Zaborowsky was peering at her intently. "Why?"

"Because . . ."

She tried to figure out how to explain it, in a way that would make sense to a young man who came from this era and didn't have the benefit of being able to look back on it from her vantage point centuries later.

"Because the worst thing about Polish history is that it was such a tragedy, what happened. It *could* have turned out completely differently. The potential that was destroyed was incredible. In the middle ages, Poland was as advanced as any European country, at least in most respects. And much farther advanced, in some. No other European country developed Poland's traditions of religious toleration and multi-nationalism, for instance."

Jakub grunted. "That was under the Jagiellonian dynasty. During the reign of Stefan Batory also. Those kings always favored the lower classes and the burghers, against the great lords. Just like the Vasas do in Sweden. But our branch of the Vasas, when they became Poland's ruling dynasty, did the exact opposite. Since they really only care about regaining the Swedish crown which they think belongs to them, they

allied with the great magnates. It is ruining our country. Everything is now subordinated to the grain trade. The conditions for the peasants get worse every year, and the towns are shrinking. Even the richest burghers have no favor at all, any more, and while most of the szlachta—stupid bastards—bask in their official status as the equals of the magnates, the fact is they are becoming nothing more than lowly vassals."

That . . . was a pretty damn good summation of what had happened to the Commonwealth in the half century since the Poles and Lithuanians made the mistake of electing Zygmunt III Vasa to the crown. The question was, could the situation still be turned around?

She returned Zaborowsky's gaze with one that was every bit as intense. And reminded herself, not for the first time since the Ring of Fire, what a terrible mistake it could be to underestimate the people of the seventeenth century.

"Yes," she murmured. "*Hell*, yes."

* * *

The next morning, when Melissa and James came down to the dining hall for breakfast, they found Morris Roth standing at the window with a letter in his hand. He has a very peculiar expression on his face.

"What's up, Morris?" asked James.

"Huh?" Roth looked at them, a bit startled. Then, looked down at the letter.

"I just got some news from Uriel. And I'm trying to sort out how I feel about it."

His eyes went back to the window and his gaze seemed out of focus. "He's one of the great arch-villains in Jewish history, you know. Not up there with Hitler and Himmler, of course. No one is. But he's solidly in the second rank. So I'm wondering why I'm not dancing with glee."

"*What* are you talking about?" Melissa asked, a bit exasperated.

Morris lifted the letter. "Bohdan Chmielnicki. Today, of course, still a relatively young man and just a minor officer among the registered Cossacks."

"And . . ."

"He's dead. He was assassinated two weeks ago, at his estate in Subotiv. Three men appeared to have done it. None of them were apprehended, because he was just a minor officer and wasn't surrounded by guards. The suspicion is that they were Polish, but no one really knows."

He gave James a wry little smile. "What was it you said last night? 'No virus or bacillus who ever lived is as contagious a vector as those fricking books in Grantville.' You sure had the right of it. Someone must have read the future history and figured they'd take out the leader of the 1648 rebellion before he got any further." He shook his head. "As if that'll really change anything."

Melissa took in a long, slow breath. "So. That means there's already at least one conspiracy afoot." She smiled wryly herself. "One other, I guess I should say.

Morris nodded. "Yes. It's starting."

* * *

Red Sybolt, the two Poles and the Cossack Federovych left less than an hour later. Their destination: the Zaporizhian Sich, the great Cossack fortress on an island in the Dnieper. It would take them weeks to get there, but Red didn't want to lose any time—and Dmytro Federovych was practically champing at the bit. "You're sure about this, Red?" James Nichols asked dubiously.

"Oh, hell yes. In politics just like in war, Nathan Bedford Forrest's maxim applies, even if he was a stinking murderous racist bastard they shoulda hung after the civil war. 'Get there firstest with the mostest.'"

James looked at him, then at his companions. "I count four of you. As in, 'fewer than the fingers of one hand.'"

Red grinned. "So we'll make do. Get there firstest." He shrugged. "Look, James, the Cossacks will be boiling mad. By now, even the Cossacks—well, some of them, anyway, even if Chmielnicki himself seems to have been in the dark—will know the gist of that future history too. They'll figure it just like we do. This was ordered by one of the Polish magnates. Or, most likely, a cabal of Polish magnates. And if they don't know, by some odd chance—"

He bestowed the grin on Melissa, now. "I just so happen to have some copies of the relevant passages, from those books of yours I borrowed for a time."

"Swiped for a time," she growled.

"Whatever."

Melissa was just as dubious about Red's project as James was. "Fine, fine. But . . ."

She looked at Jakub and Krzysztof. "*They're* Polish. And while nobody is ever going to confuse you with a nobleman, Red, you're not exactly going to blend right in with Cossacks. Has it occurred to you they're likely to chop first and ask questions later?"

"I figure Dmytro can run interference for us. If we even need it at all. Cossacks aren't actually mindless, you know. They're also not going to confuse any of us with great magnates, either. And there really isn't that big an ethnic issue, in the first place. A hell of a lot of Cossacks are former Poles, and a good chunk of their officers are former szlachta."

James' eyebrows lifted. "Really?"

"Oh, yeah." His grin seemed insuppressible this morning. Red always did love a fight. "It's a complicated world, you know. Or hadn't you noticed already?"

"Be off, then, Red," Melissa said softly. "I'd add 'Godspeed,' but I'm an atheist. Still, the sentiment's the same."

* * *

After they were gone, James shook his head. "Do you think we'll ever see the rascal again?"

Melissa had been wondering the same thing. After a pause, she said: "Yes, actually. Coal operators have—had, will have, whatever—the same mindset as great Polish magnates."

"And . . . your point is?"

She nodded in the direction Red and his companions had taken. "They really, really hated that man, James. But he's still here, isn't he?" She burst into laughter. "Three and a half centuries earlier!"

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Letters of Trade

Written by David Dingwall



October 1630

Downham Market, Norfolk

To John Paulet, Winchester

To my good friend John, and to your lady wife Jane, we congratulate you at the glad news of the birth of your first son, Charles. We hope both mother and child are well, and his auspices are favourable.

John, Mary and I have heard of last year's Parliament from my lord Francis Russell, earl of Bedford. From the problems in your last note in June, we have been concerned for you both, it is hoped that outgoing expenses during your attendance as a Member in London were not extreme, and recovery of your estates continue. We had not expected your father's past entertainments would be covered by the banks to such an extent, nor the reports in the London papers to bring such unwelcome public revelations on his death.

On a happier note, I must let you know your visit to London has also caused trouble in the Weasenham house. We hear an ode to your wife's presence and beauty at Court is published by that Cambridge upstart John Milton, and is available in his latest collection from publishers in the Strand. Mary has asked, in jest hopefully, how I might commission one for her. No trips to London for us I think, but now must take her with us to Hamburg to shop whilst my Uncle and I arrange future trade.

However, mainly I write of the King's Commission at Lynn this past week. Attending on behalf of our family's trading and estate interests, my brother and I heard that the proposal from the king's embankment engineer, Sir Cornelius Vermuyden, to drain the Great Fen has finally been agreed at the Privy Council, but in detail I have some surprising news.

Lacking capital to the satisfaction of the Drainage Commissioners, Vermuyden is no longer undertaker of the venture. Representations (and, we are sure, some monies) from attending landowners persuaded the commissioners that further capital is required to complete the works.

After the deaths and riots at the works at Aldeney Island and Hatfield Chase, the cases still in the Lincoln court against the king rumble on. We witnessed at the meeting many, including a spectacular oration from a Cambridgeshire squire, Cromwell, ranting on for an age about the "ancient rights of pasture and hunting on common land by god fearing fen-men being denied and ignored by land hungry foreigners." Much upset was displayed during the meeting, and the commissioners adjourned for a third day for overnight discussions with the major landholders and the bishop of Ely.

In reaching agreement, and to avoid further legal complaints, the Cambridge and Norfolk shire lords and landowners must now lead the enterprise. Francis Russell is now the undertaker, his holding of Thorney being the largest property affected by the scheme. He has promised ten thousand pounds capital to the corporation, with the expectation of retaining forty thousand acres to improve his holdings and a further ninety thousand pounds promised for the corporation from the other investors.

As you know Francis' estates in the east have not returned well without direct access to the king's highways or to port. With the new land, and an open aspect, he has boasted he now retains the architect Jones to rebuild Woburn Abbey as his family seat, and from whence he may manage his holdings and travel to London as needed.

For my family, a new great drain for the River Ouse from St. Ives to Downham Market shall cut somewhat through our lands at Hilgay, but we expect equal replacement, and are promised in writing an addition of five hundred acres from reclaimed sections for assistance

in canvassing parish landholders and using our family links with the town council at Lynn to agree the plans.

Vermuyden shall continue in the syndicate as works director, and other English and Zeeland connections are also promised their own land grants at the end of the task, to the satisfaction of the commission. Ten thousand men to labor are expected, preference now offered to local men, then Protestants from the Spanish Netherlands and lastly from the Dutch Provinces.

The Commissioners shall sponsor an Act of Parliament, "The Lynn Measure." If the works can keep the designated land clear for two consecutive summer growing seasons by 1638, then parcels and land grants shall be allocated. If not, the Company must bear the brunt of all capital costs, with no recourse to the courts or the king. Let us hope this is an end to open envy speculation, and with a clear relationship between a man's effort (or capital) over seven years, and the resultant land assigned to him.

At market, the grain harvest is good and fine this year, however prices are still depressed below last. In our eastern counties landowners are attempting other alternatives from the Gardeners' Company. Grain is hardly profitable, and in many places in Norfolk is grown only to feed the families idling on estates. We understand in the southern counties you have similar experiments, with George Bedford working to producing the dye madder for the first time outside the Low Countries.

Baltic grain does not land; most is diverted to the Germanies via Hamburg, and we expect none for some time. Our farmers with small plots are now completely dependent on any local surplus from market in good harvest years. We expect hunger, suffering and death when the dice rolls the other way, which it must.

Sufficient timber arrives from Sweden and the Pole's lands at our yards at both Lynn and Wisbech before the winter gales. I shall include this note and packet with the final shipment of Polish oak beams to the Cathedral School at Winchester, via Southampton, and hope it reaches you before the end of the year.

Lastly, my father has asked to enclose samples of good seed on trial from the Gardeners' Company in London, with directions on handling. He asked that you attempt them on your lime soil at your estate in Southamptonshire, as we do not think of them well in our peat, nor do we have space apart from our part of the ongoing woad experiments for the Dyers Company.

Be well with God my friend, and do let us know if there is anything further we can do to assist in balancing your estate debts. As usual, we shall keep an ear to the news coming our way from London, from the Germanies and Baltics, and shall share anything to our mutual advantage.

Your Servant,

Robert Weasenham

1632, November, A Road near Heidelberg

"Can you remind me again why I'm freezing my arse off on this god-forsaken mission of yours?" grumbled a faint voice thru the driving sleet, from under a wet fur hat.

"Oh, the usual when dealing with the London Companies—connections, bribery and profit, especially the bribery and connections," Rob shouted back through the wind.

Tom Cotton was a city boy in his late thirties, and not a great traveler. *"I'd rather be in a gaming house in London at this time of year, not plonked on the back of a bony nag in bad weather. Or at least give me a coach with soft pillows, and a curtain to keep off the wind."*

As the mission leader, Rob Weasenham was enjoying his cousin's discomfort, watching his companion hunched unhappily on the horse in front. Tom had always been a bit of a fashionist, too much time dressing up at Court, not enough in the fresh air. Their small trade party was well covered with guards, but they needed to move quickly to avoid the worst of the winter.

"Let us hope the next change of horses is an improvement," Tom muttered.

"Take Tom, you'll need someone who knows books" a friend in London had suggested. "He's been a miserable git, moping about town since his father died." Well, Rob had him now, but he could have done without the constant whining about the weather, mud on his fine clothes, traveler's rations, rotgut wine, and a hundred other complaints through Dover, Calais, Paris, and parts east. And now diverting further south was wasting valuable time, and costing more than Rob had expected, the Swedish armies had taken the Rhine/Main junction at Mainz last year, and that route was reported as still not safe.

"Another hour, we should find the inn. Soon, Tom; another hour and you can drink yourself silly with some hot wine." Rob resigned himself to another bad night shepherding his investment, and an expectation of another thumping head in the morning. His cousin's drinking had always been a bit free in Oxford, but he'd settled down when he'd married Margaret, and running the estate at Connington. Taking on his father's responsibilities last year had been a bit of a shock, but what do could you expect when the king put the old man in the Tower over winter? Rob had not spent time with Tom for a few years, and was tired of dealing with a relation continually looking for answers in the bottom of a glass.

But the bulge under Rob's coat with the packet of letters from London was a constant reminder of the opportunities for, at least, some major favors awaiting back home.

Most of the letters and lists were due to connections in the City, mainly flapping tongues in trade halls and the Exchange in the City. The Apothecaries had started it—"Dr. Harvey has promised some seeds to a Master Little for a physic garden, and we must have some cannabis from Mr. Stoner."

It went from there to the Mercers—"find any almanacs, especially information on harvests and the weather." "*Riiiiight*," Rob thought. "*Try to fix the price of grain for the next twenty years.*" Rob and his uncle didn't believe those London pedants had thought through that more could be made playing the European shipping insurance market to best advantage with the same information.

Next, the Gardeners' Company chimed in—"we have heard Grantville plants cabbage, squashes and other Dutch crops in the way of our market gardeners. Record growing methods, and any seed varieties. We also have been unable to grow potatoes well, unlike Ireland. Do they have some that would suit England?"



And the Silk Makers—"if this place is truly from Virginia in the Americas, search for Red Mulberry trees, as the seeds and cuttings from Jamestown have not served us well from long ocean voyages. Mayhap seed available closer to and planted earlier shall be more palatable to our silk worms."

And the rest. Rob carried wish lists from all the other London Companies, wanting an English merchant with active trade contacts in Thuringia.

The court was in quiet turmoil, but for once the palace birds were not squawking and little of the king's intentions were known. Concerned at the rumors, his worship the mayor of London, had arranged a secret Companies meeting in the Guildhall, along with the professors from Gresham College for advice on what to do next. London's trade must not suffer, and when money was at stake, when did the City and its merchants wait for guidance from any king?

His old Oxford college friend—now a professor—John Greaves had therefore suggested the Weasenhams at Lynn for an off-the-books visit. The Dyers Company also had connections to Erfurt from ten years before because of Rob's uncle William supplying German woad plants and extraction methods to various landowners in an attempt to make England self-sufficient in the blue dye.

So here Rob was. October and November in the rain with a grumpy cousin, the license to travel to Grantville that had been much harder to obtain than anyone would believe, and a pocket full of wild expectations. He had hoped to use the existing relationship with Erfurt as an excuse to travel, but the French were having none of it. He and Tom were both taking a calculated risk to get to Grantville before winter set in, and get out before any more roving armies attempting to flatten it the following spring arrived.

Another note that had caused them to be on their horses in filthy weather was sitting safely in a desk at home. Stark bribery! Uncle William had judged the risk and that had tipped the balance. Rob and Tom were to go to Grantville.

* * *

To Master William and Journeyman Robert Weasenham, Hilgay, Norfolk
Most Private and Confidential
Sirs,

Professor Greaves was kind to mention you have agreed to visit Thuringia and Grantville for his worship, the mayor. May I also ask to add a charge of my own, and to your family's benefit?

With the new tasks in the Great Fen, and developing Covent Garden in West London, I have secured against all capital and a percentage of my rents for next years. My fellow investors must know if our intended endeavors succeed, and what troubles to avoid on the way.

There have been mentions of a great "English Encyclopedia," and other history books in the Grantville Library that is open to all that come. It is hoped that somewhere an indication of the result of the Lynn Measure in six years shall be recorded.

As for Covent Garden, I continue to be exasperated. Our king demands beauty in design and form, but it is not his monies at risk if I may not find tenants. Acquire a selection of some building designs from Grantville suitable for his majesty's approval, and any plans that shall help my agents in London to keep my bankers at bay.

If you can find what you may before summer next, the Levels Corporation shall add five thousand acres to your family's allotment at the Isle of Southery from Mr. Lien's piece.

Robert, I have also contacted your cousin Thomas, and in confidence have encouraged him to travel with you. He is still not attending to business and is continually in his cups in town, and gambling heavily since your godfather, Sir Robert, passed. Thomas now holds the largest library in England and should be certain to sift information wanted by the London Companies and myself, for you were never one inclined for the books unless it contains a column of numbers. If we can include him a part of this mission and under your direction, mayhap the cloud may be lifted from his countenance.

In your debt,

Francis, Baron Russell, Earl of Bedford

1632, December, Grantville

Thomas removed his hat and strode into the double doorway of the Grantville Public Library. His cousin was off doing more deals for the day, but Tom had reassured him this was not yet the right time to be exploring through the book collections in this wonderful place. Tom knew that when visiting another's library he should arrange to impress the owner or sponsor first with a few gifts.

"My bailiwick, I think," he had assured Rob, and then left their lodgings at the schloss above the "power plant" on his new horse earlier this morning. He then headed back down the new road into Grantville in the snow.

Rob and Tom had tried the previous day to negotiate with the town council, but it seemed that in Grantville the Milady Head Librarian was God Almighty in her bailiwick, and the governor of this town had little to do with arrangements and policies for access to the book collection.

Once inside the building, Tom handed his cloak, hat, and silver tipped walking staff to the elderly guard inside the library doorway. Some things might change, but some were reassuringly familiar. A sharp-eyed pensioner watching the comings and goings like a hawk in the entrance was exactly what he had expected.

* * *

Cecelia Calafano was standing behind the main desk, sorting—not very enthusiastically—through today's batch of newspapers and magazines from the re-cycling ferrets. Most of the textbooks had moved to the high school, and the deep reference section shelves were just the right depth to be stacked flat with newspapers and magazines by year, month, and edition.

She looked up when the door opened and suppressed a groan. The approaching well-dressed figure was unwelcome. Nearly all the new library visitors were directed to the high school, and Cecelia was not in the mood to deal with anyone.

"*Chandler Bing in black velvet, a lace shawl, and pointy shoes.*" That was the first thing that came to her mind. She suppressed a snort, attempted a straight face, wiped her nose with a handkerchief, then began to put a flea in his ear using her improving German. "You will want to go to the school . . ."

He cut her off in perfect, formal English. "Good day, Madam. I have come to make introductions and would arrange a meeting with Milady Marietta Fielder."

The man placed what looked like a map roll case on the counter, and handed over a parchment envelope with a finely gloved right hand. "I wish to converse with Milady Fielder urgently. Can you tell me when her duties may allow her to be next available?" he insisted.

Cecelia sniffed, blew her nose loudly into her cotton handkerchief, and wished someone would hurry up and re-invent a decent, fast-acting, twenty-four hour cold remedy. "Mrs. Fielder is off sick with the flu, and can't be disturbed. I'm in charge. What do you want?" She knew she growled at him; her headache, sore joints, and wheezy chest were beginning to really piss her off.

His unexpected response was, "In that case, good lady, may I view your index?"

The question jarred her into her fuddled head, making her concentrate. Her librarian's instinct started flashing little red stars—no, it wasn't just because she'd blown too hard into her hanky. Most of the visitors dived straight to the history books, technical manuals, and

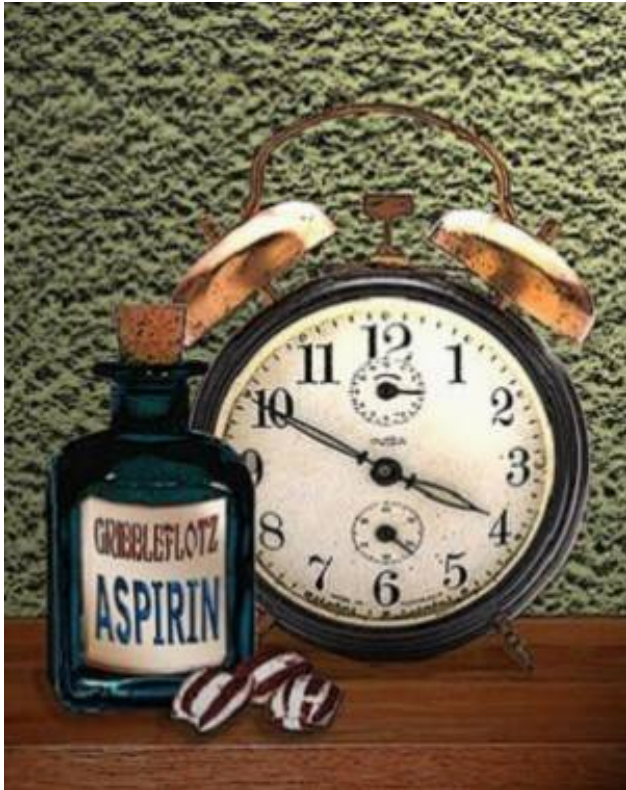
political novels. No one asked about the index first. It usually took at least three visits to begin to civilize them.

Cecelia, still not mentally quite there yet, thought of a question from college, which popped out. "And which cataloging and indexing methods are you familiar with?"

His answer had her and her new guest sitting in a chair in the back office ten minutes later, with some tea brewing on her small hot plate. Cecelia grabbed the phone and started dialing.

* * *

Marietta Fielder wished she were dead. Dead would be easy, dead would be warm and less painful. Every winter since she was a child she had caught the latest sniffle, cold, or exotic flu. Regular as clockwork for the past ten years, she'd made a point of getting her flu shot early November, either at the mall in Fairmont, or from the doctor in town. Most of the time it had worked, and winter wasn't as bad as it could have been.



This year was worse than 1969. This time it *hurt*. No shots, no Advil for the migraines, precious little lemon juice. But she was mobile—just enough that she could be left safely at home alone during the day.

Shuffle to the toilet wrapped in an old dressing gown and bunny slippers, cough and splutter back to bed. All that was available was Gribbleflotz aspirin and some peppermints. Yuck!

Shaking her head in disgust while standing was a visceral mistake. Marietta gasped, held onto the rail at the top of the stairs waiting for her vision to return and slowly worked her way back to bed, levering herself back slowly under the quilt.

A thrash metal rock band erupted from the phone next to her head. More vision loss in an attempt to grab the handset. "What'cha want? No respect for the dead?" the corpse moaned down the line

Cecelia was gabbling at her. Marietta could hear her also coughing, spluttering, and the odd sneeze, but still gabbling.

"Marietta, we have a visitor, from England, insisting that he wants to meet you, *sniff*," Cecelia chattered away. "He has presents and everything."

Marietta was sure there was a combined chortle, giggle and a wet snort in the middle of that sentence.

* * *

Cecelia looked down at the map roll emptied onto the desk between her and their visitor. She ran her hand over "A Mapped of Massachusetts Bay Colony for His Worship Governor John Winthrop" and a package of papers marked "Inventories and Maps of Plymouth Colony, 1621" that were signed by a Captain Christopher Jones.

"He's a walking, talking librarian's Christmas present." This time Cecelia lost it completely, and barked out a laugh. *Oooohhhh!* More sore ribs, but worth it.

Her guest stared, frozen, with goggle eyes, perhaps wondering what had gotten into this sniffing, grumpy lady with the stupid smile. She waved one hand, mouthed, "Wait."

"Marietta, do you remember your first term taking your M.A.? Indexing and Classification Systems . . . Middle Ages to Victorian?"

Now she was enjoying herself. Life at the libraries had been a hell for the past couple of years. It seemed that God was having a little joke with the last two qualified librarians (or was that first?) in this universe. "You have someone here who uses the Caesarean Library Index—ACCCDEFGJJNOTTVV"

Getting into it (and being a smarty pants to boot), Cecelia quoted by rote from her college days, "Augustus, Caligula, Claudius, Cleopatra, Domitian, Faustina, Galba, Julius, Justinus, Nero, Otho, Tiberius, Titus, Vespasian, and Vitellius."

Tom nodded sharply, a grudging smile on his face.

A short garbled mutter from down the line, Cecelia answered sharply, "No chance, the British Library won't exist for another one hundred and twenty years, *before that* . . . where did the British Library get the Caesars' Index?"

More waiting, and then Cecelia heard a particularly painfully sounding exclamation from the handset. Finally, Marietta was getting very close.

"No, not him. His son. Yup! His father died over a year ago." Looking directly into Tom's sad eyes, Cecelia proclaimed, "I have Sir Thomas Cotton from London right in front of me, proposing some kind of library exchange program with the Guildhall in London, the Bodleian Library in Oxford, and Sir Robert Cotton's Antiquarian Library at Connington Manor."

Tom was satisfied that his family's reputation for preserving books and manuscripts had survived.

1633 June, Woburn Abbey, Bedfordshire

Francis Russell opened the shutters of his reception room window, looking down on the fallow deer grazing on the lawn in the late afternoon sunshine. He tossed his satchel with the paperwork from London onto his oak desk, and sat back to light his favorite pipe; smoke curling gently to the ceiling.

The now not-so-secret mission to Thuringia had not yet returned when Francis was summoned to Blackfriars Palace in April. Wentworth had informed him he had traded all of the king's twelve thousand acre interest in the Levels Corporation to others: selected landowners, merchants, minor lords and barons.

A condition was that Francis was to keep the "New Men" closely involved in the project, out of London and away from court. No doubt Wentworth was playing chess games with information from the history books. And Vermuyden—him too: no speculating on the London market, no crazy ventures in mining, keep him and his out from under the king's feet.

At the time the offer was a gift from heaven. Real investors with capital were always preferable to King Charles Stuart, who was always glad to spend other people's money with the slash of a pen. After the ham-fisted affair at St. Ives with Squire Cromwell's family, the king's boast that he could govern well without Parliament was going very sour, and Francis was pleased he had severed all current financial ties with the court. His bankers had also indicated with an improved rate of interest, and had also accelerated payments for the building work on Covent Garden Square on improved terms.

Now his old childhood playmate, Robert Weasenham had come back—alone. To be fair, he had delivered everything Francis had commissioned, and more. Tom Cotton had died in Grantville from a hot winter fever; however his bookwork had mainly been completed with precise collation of information that indicated that the Lynn Measure would fail.

"Whilst clear on certain details, the histories indicate the Measure will fail due to bad weather, thus some of the ditches and dykes must fail during some winter storm in 1636 or 1637. The other landowners also complain that the drainage is insufficient."

Francis' own encyclopedia entries had recorded that King Charles had assumed the project after the failure in 1638, and the impetus to complete the works had been lost until after a civil war. It also suggested that in that other history Cromwell was the coming man, and he had supported the completion of the project during the 1640s. Cromwell was a prickly subject for Wentworth and the king. Francis knew well enough to stay away from that subject in London.

A page from a 1994 road map of England (What was a "rental car"?) and encyclopedia entries for the towns in the Fen area showed the revised works during the late 1640s and thereafter for the next three hundred years. Francis now knew that they needed another parallel drainage canal for the Ouse, changes to the outflows of both the Nene and Ouse, high tide retaining gates at the river mouths, flood relief reservoirs. The list went on and on and on. This warranted more capital, more men, and he still had only five years to finish. Francis shook his head in wonder. The existing investors and the New Men would certainly have enough to keep them full occupied, and Francis had decided to delegate the financial arrangements more than he usually liked.

And for himself—only eight years left to manage his affairs. God! Seeing your own life history written down would sear any man's soul. Robert had assured him that these "Americans" believed God had changed what was written by bringing Grantville to this time. Francis had huffed and puffed at Robert, especially not understanding the story about the butterfly, and dismissed it as a piece of whimsy. Francis was a practical sort of man, what was written is written. He had immediately updated the will and inheritance clearly onto his children.

He now had had only two available options to attempt to square his debts before his potential death in 1641. He played the arguments again through his mind:

WHEN IN DOUBT—"LOOK IT UP" IN The *Encyclopaedia Britannica*



New 11th Edition/Issued 1910-11 by the
CAMBRIDGE UNIVERSITY PRESS (England)

The Sum of Human Knowledge

29 volumes, 28,150 pages,
44,000,000 words of text.
Printed on thin, but strong
opaque India paper, each
volume but one inch in
thickness.

THE BOOK TO ASK QUESTIONS OF

FOR READING OR FOR STUDY

Point the First: Covent Garden

Here the information was very, very good, especially for a developer. His original plans had finally turned out well it seemed, and his descendants had prospered as a result. Francis had leaked a little of this information to the London market, and waited for offers to assist in bringing his plans to completion.

The keys to early success were not housing and tenants as originally thought, but shops, arcades, and the concentration of specific trades. Booksellers and map makers on one street, tailors of high fashion on another and the vegetable and flower sellers concentrated in a single square. He would be damned if he would give them Covent Garden Square, and preferred its more profitable later use as a fashionable covered arcade for shops and dining. More work for Inigo Jones, after he finished the church on the west side.

He also enjoyed the idea of a sober theatre with large columns and retiring rooms on the north side. That would please the king, and his agents had already been approached with offers to fund and build it by the Mercers Company.

As far as Francis knew, Rob had bought the only copy of the "Central London A-Z" map. Therefore he had only changed one thing on his original street plan, renaming the newly assigned tailors street "Saville Rowe." No one would ever know the difference.

Covent Garden should bring in about three-quarters of what was needed, especially the idea of the nine hundred and ninety-nine year leases, and recurring land rents. *Cobnuts to the Duke of Westminster, whoever he was!*

Point the Second: The Great Level

This was going to be a little trickier. There was an obvious new source of capital: Dutch landowners and merchants salting their monies outside the United Provinces. Robert had similar concerns about the introduction of a flood of new residents to the Fen. So they had decided on a two-pronged approach

Set land aside near the existing towns for housing, to generate more land rents and increase the tithe returns for the towns and surrounding areas. Use the American style of building in "divisions," using a local developer to build town houses, shops, schools and amenities, and releasing them for sale in stages. In these ways new families, their retainers, and the merchants they depended on could be introduced gradually. If possible, grease the palms of councilors, and co-opt the Gardeners' Company to the scheme. The seed of this idea came from Tom Cotton's copies of 1930's encyclopedia entries on English towns that did not yet exist: Letchworth and Welwyn Garden Cities, "planned in advance and surrounded by a permanent belt of agricultural land." And they now knew which crops would thrive on the new level; so there was no need for experimentation. Francis liked the sound of "Wisbech Garden City."

Lastly, apprentice the children of prominent Dutch merchants to the corporation. The war on the continent was not going well for the United Provinces; it would allow fathers to get their sons and daughters safely out of the way of Spanish armies for a time. An example had come from a "Second World War" picture book; it had described English children being fostered abroad to escape war's ravages and hunger. The effort was to be circulated in the press and churches as "true Christian charity." The children would continue to learn their trades, and many would probably stay and make a life, thus tying their families' fortunes to the area. Let any man tell the Dutch children's accents from a fen man after five years, and Francis would pay him twenty pounds.

There was a lot still to think about. Francis quenched his pipe and reopened his account book. The bankers' meeting was next Thursday and the numbers seemed to total up quite well, but Vermuyden was coming over to be briefed tomorrow. Francis was unsure how that second meeting would go, on one hand his Director's name was still known in the future; "Vermuyden's Plans" had its own place in the encyclopedia entry for the Great Fen. On the other, immediately thereafter the plan's shortcomings, losses to intentional flooding in a war, and how others had tried to resolve his flawed design might bruise a touchy ego.

1633 October, A Wednesday, Englefield House, Reading, Berkshire

Rob and the other groomsman knocked on the door of Englefield House, and then returned down to the bottom step. The white double doors opened, and two Irish lads waited; one in green and the other brown and blue corduroy jerkins, both decorated with blue flowers and green herbs.

"The brothers, I suppose," he speculated, not that he cared at this point.

"Will she come, lads? Tell us if your lady will come?" Rob's fellow groomsman asked the bridesmen barring the doorway.

The brothers turned inside the house, and returned escorting the bride. Her hair hung to her waist, her dress was all blue satin, pearls, flowers and mixed ribbons as she stood between their linked arms. "Aye, here she comes. We go to St. Marks to see her wed, do ye come?" they said in unison.

A large cheer from the villagers behind the groom's party responded favorably, and a few dirty suggestions volleyed over the back of Rob's head. *A country wedding indeed!*

The two groomsman returned to their own party and watched as the bride's family and friends funneled through the front door and down the lane after the bride and her two brothers. Two bridesmaids tailed their group, as usual checking out the potential young bucks in both parties.

The bride's father nodded to Rob on the way past. They had negotiated the match between them in Dublin last month. After John Paulet's first wife, Jane had died suddenly; the pressure to marry him off again as quickly as possible had been, for a well-landed English nobleman, immense. The line must have more children; new alliances should be forged, and others quietly forgotten. The tight Roman Catholic community in England all had opinions on who John should marry, why, and for how much money.

Although not a Catholic, Robert had offered to take the pressure off. John had still not cared at that point, still missing his "bonnie Jane," and fretting after his only son.

Even though Grantville was said to change this world's story, Rob wasn't in the mood to push John's fate further. Milton's poem had been revived and revised for the funeral. John had been lost in his grief.

This girl was recorded in the histories as giving John healthy sons and daughters in the Other Place, so Rob had resigned himself to his task. If God pleased this to be, so would it be again. From John's biography, and knowing her given name "Honoura," it had not been hard; the history books had said she was Irish, obviously Roman Catholic, and titled. Her father owning Englefield clinched it, he was sure it was the right family

Rob had pressed his friend's case, and showed the information to the earl of Clanricarde, but the two had still tussled the terms between them this weekend past to settle for a dowry. Only then had the intended couple been allowed to meet for a short walk and conversation at Aldermaston on Monday.

The house, estate and rents of Englefield House would transfer to the groom's family. In return John and his new bride must follow the Irish tradition—thirty days in this house between wedding and returning to John's own home near Basingstoke. The estate workers had the traditional Irish wedding mead and the feast waiting in the main barn for after the ceremony.

Rob gathered the groom in his finery, and called the rest of the visiting party to order. His wife Mary held onto young Charles Paulet's hand on the half-mile walk to the church with the lad's nurse. Ellen Margaret Cotton, her first outing since her mourning period was completed, gathered the children to her, with the first signs of a tear in her eye. It was nice to see some color in her dress at last; yellow mourning clothes had not suited her at all the past year.

"Hmm, I'll ask Mary about seeing for Margaret also. All alone in a draughty house is not safe for a widow," Rob mused. In some part of his mind, he could have done without the additional paperwork of Connington on his plate. When he'd offered to stand witness to Tom's will in all the haste before traveling to Thuringia, he'd forgotten that there were no other Cotton men of age to be the prime executor.

"Ah, well." Robert smiled. He, too, could make best use of the next thirty days. At his request, John's estate steward had already been exchanging letters with his family at Hilgay in secret. Rob's recollection from years before, visiting between terms at Oxford, of John's main estate land and facilities had not been off course. Between them they had ventured that the happy couple's wedding present from the Weasenhams might help clear John's debts in three or four years, and set the family up for life.

In Grantville last year, Rob had been held in "isolation" for three weeks, whilst his cousin had suffered and died of his fever. The doctors had explained that the hot fever changes its mood periodically, and a few hundred years of changes had hit Tom's drink-weakened humours, or "immune system" hard. Tom had so wanted to meet the two ladies, and in his short happiness of seeing a new library, it had killed him.

While waiting to be allowed to leave Grantville, Rob had finally, with reluctance, turned to the books himself but naturally wanted to follow up on his family's specialty: the future trade market in the Germanies. He had bought or borrowed every book and pamphlet he could, including those from the Grange, the libraries, and the personal collections of the history "buffs" he had been introduced to.

The typical crops described from the encyclopedias in the twentieth century for Norfolk, and Lincolnshire areas had led to the making of some positive notes by Tom for the Gardeners'. Rob had laughed that the Dutch methods of vegetable farming were later called "The Norfolk method."

Back in England Rob's family and other landowners were interested in introducing all the crop varieties to the Level when the works completed. But in the meantime, they needed somewhere to try out some of the planting and refining methods described in the 1911 Encyclopedia Britannica for one crop in particular.

In his last week Rob had delved into an enjoyable and entertaining read of some of the series of books following the character "Hornblower," some which mentioned the closing of European ports by the English during the Napoleonic War. It had had drawn parallels in Rob's mind to England's current trade gap. At the moment the most expensive international commodities went first to Amsterdam, Hamburg, Venice, or Istanbul. Without a strong English trade fleet London, Southampton, Lynn, Boston, and Bristol were at best secondary markets for some products, with all the appropriate mark-ups.

Excited, he had asked for other story and history books on the same period. Finally one had described, in some detail, a dinner in a future German province of "Prussia," in honor of Emperor Napoleon himself. It had shown an example of how some of the same Fen crops from the encyclopedia could replace the most expensive of this world's delicacies in the right market conditions. In Prussia and Silesia mills had made great profits in the early 1800s until that war ended. Rob thought there was a chance this could be done again; England now was just like the closed Continental ports during that other war. The venture would not work in Amsterdam or Hamburg, but with a Crown License, just might produce at home.

The groom's party entered the Norman church of St. Mark's, and the organ music changed to a more somber tone.

Back on the estate, a gilded box lay on the top table in the barn. The usual flowers and herbs garlanded all the walls, windows and table surfaces. Uniquely, two root crops lay next to the present. Mary still didn't quite believe he'd put a sample of red and white beetroots—Silesian winter cattle feed and sea kale—on a wedding table, but since there was no superstition to forbid him, she'd kept her mouth shut for once. Unknown to everyone but Robert, instructions on how to make sugar from these plants was locked in the box.

1634, March, Wisbech, Lincolnshire

Rob took the small oilskin wrapped parcel from the shipmaster, and stepped carefully down the gangplank to the new wharf. God's teeth, the weather was awful! The parcel went under his arm as he strode back to town, the rain bouncing off his large brimmed hat, and overcoat.

"Filthy day, sir" said Mr. Bell, the customs man from the porch of his office at the entrance to the new timber dock. "Settle up tomorrow?"

Robert swept past, trying to keep the rain from his eyes. "Noon? We should get her unloaded by then " he called back.

Not waiting for a reply, and turned the corner onto Norwich Street, then through the puddles onto West Street, and on to his in-laws' house near the church.

Wisbech streets had changed somewhat in the past two years. The Bedford Levels Corporation had contracted with the town council to land supplies, fish, and additional laborers from the war-torn United Provinces, and to rent marshaling yards and build warehouses. Three new wharfs had been built recently, and the Weasenham family had taken a larger interest in the timber dock. His men were now to fulfill the contract for the new lock gates to be installed on the Nene and Ouse Rivers to hold back the high tides.

He passed a bustle of Dutch merchants in the churchyard, including Vermuyden and his young staff. Obviously they were heading to the Nene Ditch cutting through the town, and the engineer was extolling the new land opportunities of the next phase of drainage to potential investors. The decision of naming the first section of new town houses "Meadowlands" was great press.

"You had to admire the man," Robert thought. His plans had been savaged by information from Grantville, but with copies of other books from the libraries procured by Robert, he had taken to new engineering forms like "built-in redundancy" and "risk management" like a salmon going upriver to spawn. There might have been God's hand at work in the Germanies, war in the United Provinces, and a fickle king at home, but never try and keep a Zeelander from making money, or getting his hands on more land.

He winked at the very wet lad at the back of the Dutch contingent, Vermuyden's new apprentice, young van Rosevelt. Rob had served his time following his uncle in much the same way, lagging behind unnoticed in all weathers.

Master Mercer Robert Weasenham laughed at the cycle of life, and opened the side door. "Mary, I'm back!" he called, while brushing off his hat and hanging up his overcoat on the door peg. Shoes were dropped in the box by the door. No mud through the house, or there would be hell to pay.

"Captain Williams has your fabrics and packages from Hamburg. We'll get them offloaded tomorrow morning." Rob placed the package he carried on the kitchen table, and added, "And here's the naming present for John and Honoura."

Getting books and other printed material past the king's customs-men and censors was so much easier in Wisbech than the main port in Lynn, he thought with a wry smile.

Mary smiled back, and shooed him out of the kitchen fussing over flour and pastries.

Robert hurriedly took the parcel and went upstairs to his office. Better to get this done now, so the boy could take the post before the day was done. He sat down at his desk, and wrote a short note to John Paulet on fresh paper to go with the present.

To John and Honoura,

To you both, a short missive with another package from my agents in Hamburg. We would like you both to accept this storybook as a naming present in advance of the occasion of our godchild's birth.



Mary has a German copy of this book, and suggested we procure an original "Up-time" edition in English. Note the printers are the "Oxford University Press." Ironic, John, considering our labors cleaning presses and scraping parchment as punishments for failing the Rule at Exeter College.

In the Germanies and United Provinces, a fashion has taken for Ladies to read "Romantic Fiction." Publishers are spending a fortune translating hundreds of storybooks from the Grantville libraries, and they are in wide circulation. Most involve a formula following various trials and tribulations of a young Lady, and how she finds "Eternal Love with the Man of Her Dreams." Another American phrase you will have to get used to if the London publishers are ever allowed to print this kind of thing. Unfortunately for my purse, Mary has developed a taste for these and every three months receives parcels from a "Book Club" in Magdeburg. I have learned to pace my business trips to be away the week they arrive.

Mary tells me this book was seen in the might-have-been future as the most important and influential romantic fiction "novel" ever produced and to note it is written by a gentlewoman of quality, the daughter of a Church of England incumbent. No one may reproach Honoura to read it during her confinement.

The "Romance Appreciation Society" in Magdeburg has circulated a short biography of the author, which we also include. She was (would have been?) born in your county of Southamptonshire, or "Hampshire" as it will later be named, two hundred years from now. It may be interesting to inquire to see if the Austen family has as yet any association in society near Basingstoke.

Mary and I have selected this particular book as entertainment and for your interest as there is mention of your wife's family, although as a protagonist to the main character. If the sketch is true of the future, Honoura's family continues to be well connected at court, has prospered in London, and holds large estates in England (and I assume continue still in Ireland, although there is no mention of that). However we must also include a "Glossary of Terms" as our English language has subtly changed in the next two hundred years. The researchers at the Grantville libraries were most helpful in collating the changed words, and alternate meanings. We must trouble you both to keep it at hand whilst reading.

A simple example of misunderstanding in the use of our mother tongue comes from my visit to Grantville two years ago. I was named a "Gentleman" in the first person singular during a conversation at dinner at a beer garden in town. I instantly lost my temper and of course tried to hit the man who called me thus, and needs must to be restrained by my colleagues.

A priest, a new visitor from Rome also dining that evening, stepped in and cleared up the confusion. He explained to me I was truly being described as a man of breeding and quality, and that the word had moved later in meaning back to the Old English form. To the

surprised Americans at the table at my violent reaction, he added that to a Stuart Englishman they had unknowingly insinuated I was a court ponce or a pimp.

Obviously, the German or Dutch editions of these books do not have such confusions; the publishers take care to use local phrases to pass on the intended meaning during translation. A printer in Hamburg later explained it to me using another of these attractive American terms: "No point upsetting the target audience."

Gladly, Mary and I shall be happy to stand up for the child, and we thank you both for your kind offer. We hope and expect to be with you before the end of June in time for the birth.

However she believes we have found a way to decide the argument between you both on a name for the little one, and a suggestion.

Mary speculates using Honoura's family's' future Christian names, as shown in the book.

She suggests naming the child "Darcy" if a boy, or a girl "Catherine."

Yours,

Robert and Mary Weasenham

Robert folded the paper, unfolded one side of the parcel, and slid the note inside next to the exquisite up-time book and the glossary. Resealing the parcel, he wrote an address on a scrap piece of paper to give to the boy to send by messenger

To: The Marquis of Winchester Lord John Paulet,

and his Wife, Lady Honoura De Berg

Basing House

Southamptonshire

* * *

Notes for the Reader

All the English characters are historical. The Englishmen attended or were around Exeter College, Oxford between 1610 and 1620. The Russell and Paulet families were heavily involved in developing the English woad experiments in their western estates in Cornwall and Dorset respectively.

The Weasenhams had been trading from Bishops Lynn (Renamed Kings Lynn in Tudor times) since the 1330s. The family were one the four strongest English trading families with links to the Hanseatic League, "The Hansa," until Queen Elizabeth expelled foreigners from England during her reign. By the time of this story, they have three hundred years of trade links with Hamburg and the other Baltic ports. There is still a fine example of Hansa building and a trade yard in Kings Lynn, behind a later Georgian fronting.

The Cottons were descended from a Weasenham branch that needed to marry a son off quickly to a rich heiress in the 1380s to avoid bankruptcy. They chose a girl from the Scots noble family "de Bruc," who included in her family tree a Scottish king, "Robert the Bruce" as we now call him. Tom's father, Sir Robert Cotton, meddled in politics frequently, and sidled up to the new King James when he came down from Scotland to take the English throne. Robert flashed his family tree, added "Bruce" as a middle name and ingratiated himself to the point that King James was later persuaded to call him "Cousin." Apart from a few short stays in the Tower of London, (a time-out zone for many a Privy Councilor) Sir Robert is famous for his Antiquarian Library, which became the one of the seeds of the British Library in 1750s, and inventing his own peculiar Caesarian classification system.

<http://www.npg.org.uk/live/search/portrait.asp?search=ss&sText=cotton&LinkID=mp01052&rNo=0&role=sit>

and a gorgeous one, recently found

<http://www.trin.cam.ac.uk/sdk13/chartwww/miscimages/cotton.gif>

Sir Thomas Cotton stayed out of the limelight and lived out his life at Connington Manor maintaining his father's library and adding to the family collection with contemporary architectural building plans, copies of navigation and colonial maps, and other ephemera, most of which was lost during a fire in the 1730s. There seems to have been an open deal in London where second copies of plans, log books, and anything else "useful" that they could get their hands on ended in the Library. "Fashionist" is a real word, and was first recorded in 1616 in London, then died from use within twenty years.

Sir Cornelius Vermuyden also "sucked up big time" to King James and King Charles, finally getting into land reclamation for wealthy Englishmen and the crown. Originally from Zeeland, he started as a tax collector in the United Provinces, became a naturalized Englishman in 1626, and persuaded fourteen other Dutch "adventurers" to fund the Bedford Level Corporation scheme. There is a disputed portrait of him in a private collection, but none available online.

Cornelius' new apprentice, Claes van Rosevelt, in this version of events has been diverted from going later to Nieuw Amsterdam, and buying the famous farm in what is now Midtown Manhattan. The Vermuyden and van Rosevelt families were from the same area in Zeeland, and were friends and business associates. As a Brit I felt had to have one small change in a piece of Americana.

The fourth earl of Bedford, Francis Russell, did not expect to inherit his title. Some cousins in the main line died in quick succession, and he was landed with diverse estates and the family title. Recorded as a details man in politics, he enjoyed the fussy work of

Parliament in 1628/9, and in his projects to make money. He spent most of the 1630s working on the Great Fen project and as a property developer laying out the whole of Covent Garden in London from the Strand to what is now Russell and Bedford Squares.

<http://www.npg.org.uk/live/search/portrait.asp?search=ss&sText=francis+russell&LinkID=mp68238&rNo=0&role=sit>

The Fifth Marquis of Winchester, John Paulet was expected to inherit, but what he got were massive debts in 1628/9. His father died after twenty years of exorbitant dining, pleasures, and entertainments for guests at his home: Basing House, a larger and grander example of a Tudor mansion-style brick building than Hampton Court. John was no politician, and as his was a Roman Catholic family in trouble, decided to retire from court and quietly rebuild his family wealth. He did not appear again at court until 1639 when his second wife Honoura and the queen became friends. He is most famous for a holding action in the English Civil War, where Basing House was under siege by Parliamentarians for over two years. Eventually Cromwell himself had to come and finish the job: not surprisingly winning the day, and had the house flattened to the ground. John and family ended up in the Tower, but after the Restoration the Paulets retrieved all their estates. Lord John Paulet and his second wife Honoura are buried under the new, Victorian St. Marks' church in Englefield. The local post office, and nearby farm shop still sell honey.

<http://www.npg.org.uk/live/search/portrait.asp?LinkID=mp53758&rNo=0&role=sit>

The ruins of Basing House have been a tourist attraction on the road between London and Winchester for three hundred and fifty-odd years. Every year in late August there is a reenactment of the siege, with the "Sealed Knot" regiment on hand to show off Civil War military tactics.

<http://www3.hants.gov.uk/hampshire-museums/basing-house>

Gresham College, located in Bishopsgate, was founded to be the M.I.T. of London in 1597, paid for by the new Stock Exchange and the London Companies and Guilds. It's original charter was to provide public lectures, and apply the new knowledge becoming available from abroad to England in projects that made the city money. It has no students and awards no degrees. They were probably most successful in using mathematics to refine English shipbuilding methods, and improving magnetic compasses, giving rise to the new English trade fleet, and Royal Navy. After the Restoration Gresham College became the founding place of The Royal Society. The college still provides public lectures on science, history, culture, and finance.

<http://www.gresham.ac.uk>

Professor John Greaves, Chair of Geometry (Mathematics) 1631-32 at Gresham College specialized in Arabic Studies; he collected many science books from Turkey, and traveled to Egypt. His was the first modern description of the pyramids' dimensions and astronomical alignments in the mid 1640s. I was never quite sure where Dr Phil's fascination with pyramids came from, as information in the 1630s was almost impossible to find. Maybe he needs to talk to Professor Greaves, and arrange an expedition get the revised astral alignments needed ten years earlier to get his models to work?

The English silk makers trials in the first half of the seventeenth century with red mulberry from the Americas failed; those pesky worms still preferred the white variety to everything else. That's also why white mulberry trees are scattered over the east coast of America.

During the Continental Campaigns, Napoleon was presented with large sugar loaves made with processed sugar from sugar beet. After the Napoleonic Wars ended, Britain (and Portugal) flooded the European market with cane sugar from it's newly extended Caribbean island holdings, killing the price support mechanisms in place on the continent, with the result of holding back major sugar beet processing until the next Franco-Prussian war in the 1870s, and finally expanding worldwide after World War One. Prussia and Silesia continued to make sugar locally on a smaller scale, but at a profit.

Starting up a pilot sugar extraction and processing facility is going to be very possible, even with a seventeenth-century technology base. The 1911 Encyclopedia Britannica is very specific on each step, and the machinery needed for the method of sugar extraction from sugar beet (typically a cross between wild fodder beet and sea kale, but common beetroot will also do to start). There are only three logistical essentials—plentiful fresh water supplies, a ready supply of rock lime, and lots of wood or coal to heat the water and extract carbonic gasses from the lime. Old Basing village has the first two: the river Lodden passes fifty meters from Basing House, and the modern parish is studded with features like Lychpit Farm, and The Lime Pits Play Area (400 meters from the House). Lord John Paulet also owned Pamber Forest nearby, over five square miles in size. A Paulet family survey of their lands after the Restoration in the 1660s recorded the forest had been neglected for many years and had such poor quality mature timber, and significant underwood that was all only fit for burning. Manpower is not going to be a problem; unlike the continent at war, England is awash with farm laborers with hungry mouths to feed.

Why bother with homegrown sugar? In Tudor and Stuart times England sourced most of its fine quality sugar from the prisoner island of Madiera, the rest from Amsterdam. Interestingly, there was no sugar or molasses excise tax in England, this would not happen until over 120 years later. The price was set on the Venetian and Amsterdam markets, and tied to the inflation rate of gold. The English prices varied, but in general transportation costs using English merchant ships added around 30% to the Amsterdam wholesale price. (Punishing taxes were laden on cargoes from foreign vessels as a matter of state policy, in place since the 1380s to protect English merchants, and there was a fair amount of "flagging" of ships for much the same reasons we do it today). A general import tariff of around 20% was added when the cargo landed in port, as the product was not English, nor had it come from an English colony. If you

had a town house in a port that traded in sugar, and could afford it, you bought it there. If you were in the country or an inland town or city, because of the weight and bulk of sugar loaves or lumps, the price could easily double again.

Thanks to British Sugar, for rules of thumb for the historic sugar price well before they were formed, and the Guildhall library, and the City Companies' archivists for helping me through the trade journals, and exchange rates.

Can English sugar make a profit? Well, that's another story for another day.

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The Summer of Our Discontent

Written by Virginia DeMarce



Grantville, May 1634

Susan Logsden sat in the front pew of Grantville's rebuilt Presbyterian church, flanked on one side by Grampa Ben and Grandma Gloria and on the other by her half-sister Pam Hardesty and half-brother Cory Joe Lang. She couldn't stop the tears from flowing down her face as she looked at the twin coffins. "First Grampa Fred died and now Tina has drowned," she said in a low voice. "What am I going to do now?"

Grampa Ben put his arm around her and held her tightly. "You've still got us and you've got Pam and Cory Joe. Don't worry, darlin'. We'll be here when you need us."

He looked toward the front of the church. Enoch Wiley would be coming out any minute now to start the service. Susan buried her face in his shoulder and cried. After a few minutes of heartbreaking sobs, an uproar at the back of the church made her look up. The vision that appeared at the doors was appalling. "Oh, my God," Pam said. "What does she think she's doing?"

Ben Hardesty turned to look and his face paled. "How did this happen?" he asked himself. "What did we do wrong? How could she do this?"

His daughter Velma, Susan, Pam, and Cory Joe's mother, walked down the aisle, tricked out like the "Bride of Satan."

"Where in the world did she find that much black spandex," Pam wondered. "I wouldn't have thought there was any left in Grantville."

"There isn't," Ben said. "Looks to me like Velma cornered the market.""

Susan, heartbroken and bereft, couldn't stop herself. "I'm not going to let her do this. I'm not. I know we're her kids, but I'm not going to let her do this. Grampa, I'm sorry. We can't let her turn Tina and Glenna Sue's funeral into a circus."

"Susan, honey, just stay right here," Ben said. "I'll take care of it."

Ben was an old man, heart sore from his granddaughter's death. But he wasn't going to take this from Velma, not this time. As a girl, she had gotten her way too often and she'd never learned how to take no for an answer. Ben had hoped that losing custody of Susan and Tina would have taught her a lesson, but it hadn't. Working at the 250 Club had made her even worse.

He stood and left the pew, Cory Joe following him. Intercepting Velma who was on her way down the aisle, he grabbed her arm and forced her to turn around and walk back to the door. "Velma, you're not going to do this. I can't believe you'd even try it."

He practically dragged her out the doors of the church, ignoring her protests. Those protests were loud and somewhat profane. "God damn it," Velma screeched. "How can you throw me out of my own daughter's funeral? Tina was my daughter, you know."

"She wasn't some kind of toy, Velma," Ben answered. "She'd gotten herself declared an emancipated minor because of the way you've been acting the last few years. Cory Joe and Pam left home the minute they could. The courts gave Fred custody of Susan. This drowning is not an excuse for you to make a show like this. You look like a whore, you're acting like a whore, and you're not going to make this kind of scene. Just go home, Velma. Go home and don't even try to contact us or the kids again."

She looked at Cory Joe. He moved closer to his grandfather, saying nothing. The two of them turned and went back into the church together.

Velma stood there, seething. "I'll be damned if they get away with this. I'll show the bastards. I'll show them."

Inez Wiley, the minister's wife, came out of the sacristy. With one thin hand, muscular from years of playing piano, she grasped Velma's arm firmly, leading her away from the building.

* * *

Susan pushed her supper around her plate, hanging onto Cory Joe's arm with her left hand. "So soon? Already?"

"Tomorrow morning, kid." He swallowed a deviled egg. "Boy, these are good, Aunt Betty."



Susan, huddled between Cory Joe and Pam, an image of sixteen-year-old miserable hostility, glared across the table at her aunt.

"Not as good as Grandma Lily's used to be. I use her recipe, too—but there's just something missing." Betty Wilson looked gratified in spite of her protest.

Snarky, Susan thought. Why did Grandma Gloria have to invite Aunt Betty and Uncle Monroe, anyway? Aunt Betty was always playing "good daughter" to Mom's "bad daughter"—well, "perfect daughter" to Mom's "horrid daughter." And Grandma Gloria always fell for it. Of course, when Grandma invited her, Betty brought something special, that took a lot of time and fussing to make. Like deviled eggs. Just to show how perfect she was. When everyone knew that she really despised Mom. And despised all four of them, because they were Mom's kids. And now Tina was drowned and Aunt Betty was sitting here alive. Pam scooped the last two eggs from the platter before Cory Joe could reach across the table for them. He gave her a reproachful look.

"Well." She sighed dramatically. "Since there's a war on." She slid her plate to him.

Maybe Aunt Betty was the kind of person who had something inside her that just made her bring those eggs to supper. But did Pam and Cory Joe have to eat them? And like them? And be polite about it all?

"Do you really have to go *already*, Cory Joe," Susan chimed in again.

"First thing in the morning. Jackson let me come because it was my sister's funeral, but Pam's right, even if she was making a joke. There's a war on. If that mess up at the quarry had happened two weeks ago, I couldn't have come at all. Now, after Ahrensböök, it's mainly a matter of mopping up. But I've still got to get back."

"All the way up to Denmark?"

"Just as far as Magdeburg. I'm Colonel Jackson's liaison to Don Francisco Nasi, now."

"Mike Stearns' spook?" Pam giggled. "My brother the baby spook. Like Laurie Koupsi is a baby lawyer. That's what they call her, now that she's passed her exams. Why Magdeburg? Don't you have to go out and spy on somebody?"

Monroe Wilson, Aunt Betty's husband, frowned. "You shouldn't be talking about this. Intelligence work,

I mean. Not even at a family dinner. 'Loose lips sink ships.' I remember that from school. It was a motto in World War II."

Cory Joe shook his head. "Anybody who wants to can find my name on a personnel list. Nasi doesn't go out scabbling around his spiderweb in person, any more. He sits in the capital and collects reports from other people. Just another bureaucrat. Think of me as a baby bureaucrat, not a baby spook."

Susan put her head on his shoulder. "At least, you're not likely to get shot at. But I wish you could stay home."

"At least, Pam will be staying with you, Susan," Aunt Betty said.

Pam shook her head. "Tina had a right to live in Fred Logsden's house, just like Susan does. He was their grandpa. He left it to them. But if I went over and moved in there with Susan, you know as well as I do that Mom would be down at the probate court the next day saying that I was battenning on her and trying to get my hands on my sister's inheritance. No way. I'm staying at my apartment and Cory Joe is bunking on my couch while he's here."

Ben Hardesty nodded slowly.

"Then who is staying with you, Susan?" Aunt Betty asked.

"I'm by myself."

Betty opened her mouth again.

"And I'm not going home with you, in case you were thinking of saying that, Aunt Betty, just so all your church lady friends can tell you how *kind* it is of you to take in your sister Velma's obnoxious kid."

Susan looked around the table defiantly. "I've been at the house by myself ever since the night Tina drowned. I've already been down to Judge Tito and petitioned to become an emancipated minor. I'm as old as Tina was when she did that. Mom isn't going to get her hands on me again."

She sank down between Pam and Cory Joe again. What right did she have to hate Aunt Betty for despising Velma and not having anything to do with her? She despised Velma herself and didn't want anything to do with her.

Maybe she was exactly like Aunt Betty.

And that would be the worst thing in the world.

She lifted her chin. "I'm okay by myself at Grandpa Fred's house. Everybody understands that, *right?* I'm *okay*. Don't be trying to mess up Pam's life, Aunt Betty. She's done fine on her own, since she walked out on Mom, and I will, too. Neither one of us needs for you to be trying to push her into taking care of me now that Tina's gone."

Ben Hardesty sighed.

June 1634

Veda Mae Haggerty was heading for the afternoon shift. If she had to face one more bit of good cheer, she thought that she would chuck everything. Lettie Sebastian had talked her into dropping off snacks for the Methodist Vacation Bible School. There must have been two hundred kids noisily singing

Adam, Adam, can you tell me,

*How was life in paradise?
God provided all we needed.
While it lasted, it was nice!*

She had been inclined to tell them to stuff it.

Stinking Ring of Fire. Up-time had been nice. Nicer, at least. While it lasted. Work all your life. Go back and take classes in office management after your kids are grown. Get a decent job, even if you do have to commute for forty-five minutes, winter and summer, rain or shine. Expect to retire on Social Security, enough to see you through, if you can just make it to sixty-five.

Flash of lighting and *bam!* There won't be any Social Security, any more. Go back to work, Veda Mae. You're healthy. No, nobody needs you in an office. You can go out into the fields and harvest chick peas this summer. Or be a CNA again; that's what you did before you took those classes. Go back to what you did before you went to school. The Assisted Living Center needs you. After all, you're only sixty-four years old, here in the middle of the Thirty Years' War. Turn patients, deal with incontinence. Oh, yeaay, now you get to deal with it without disposable diapers. Hoist them up into their chairs. Let's all pull together and make a brave new world.

Three years later, now, she was sixty-seven, and she was still emptying bedpans.

Gag me. Yep. While the twentieth century lasted, it had been nice. At least by comparison with the seventeenth.

Magnificent seventeenth-century victory. Hah! Gustavus Adolphus triumphant. Congress of Copenhagen. Newspapers all over the "exciting" seventeenth-century betrothal of Princess Kristina to some Danish prince. The kid was what? Seven years old? Younger than a lot of the ones sitting over at the Methodist church, singing. What were the odds that she'd actually marry this fellow some day? Low, probably. Stupid newspapers.

Then her daughter-in-law Laurie had decided that she wanted to go to nursing school. Well, Veda Mae had let Gary know just exactly what she thought of that. What was a mother for, if not to advise her son? Anybody who wanted to go into nursing was a fool; he should put his foot down. So he put his foot down. Laurie divorced him. Now he was a two-time loser, some people said, but it was still better than having Laurie go back to school and get degrees where she would have been so far above him.

She might have been better off herself, when she decided to go back and take that business course, if John had just put his foot down in the beginning, instead of saying that it was okay and then making her life miserable about "uppity women" for the next twenty years. But he'd died just over a year after it happened. She didn't miss him, much. His emphysema had been too bad for him to go back to work and the Ring of Fire had taken away his miner's pension and health benefits, so she'd been stuck supporting him, too.

But that Laurie! Worse than Jennifer, and Jennifer had been bad enough as a daughter-in-law, and then got herself left up-time, so Gary had to take their kids in again. Jennifer was probably living in Fairmont, flirting with rich guests at that motel where she worked. While Marcie was at the school, spending her days teaching English to Kraut kids and Blake was training to be a policeman, working with a Kraut partner. Having the gall to tell their own grandma not to be prejudiced!

But at least she'd told Gary to put his foot down when Laurie wanted to take up nursing. A wife shouldn't get above her husband and Gary was a dropout. Which she wasn't going to let him forget. Even

Vivian had gone back and gotten her GED, as dumb as she was. Well, not dumb, maybe, but Viv was never going to set the world on fire, if it was her own mother who said so.

And Glenna, the best of the three kids, with a decent job as a telephone lineman, had been killed by the damned Krauts. They cut her head off. People had tried to tell Veda Mae that they were something else, called Croats, who had raided the town that day, but she knew better. They'd been Krauts when her father fought them back in World War II, and they were still Krauts. Not that Glenna had been perfect either, marrying that Catholic boy. But Veda Mae had put a stop to that—not to the marriage, but she'd managed to raise enough of a ruckus that he stopped going to church and didn't make Glenna have their kids baptized in it, either. She'd heard what went on in those convents! Her grandma had a book—the liveliest book she'd ever read, back when she was twelve. She would never have dreamed. . . .

No way was Veda Mae going to learn Kraut. Not a word of it. She hadn't liked it at all when they started admitting Krauts to the assisted living center. Since they were there, if they wanted something from her, they could speak English.

Well, after she dropped off the snacks at the church, she'd picked up this week's newspaper. The *Times*, not that Kraut rag, the *Free Press*. Even so, half the news items were about Krauts. And one about Cameron. Laurie's son. Assigned to the personal staff of Colonel Jackson, up in Magdeburg. At least, they'd demoted him. "General"—now that had been a laugh. She'd known Frank Jackson since the day that he was born. He'd been a sergeant, back in Viet Nam. If he was qualified to be a general, even if just of Grantville, Veda Mae was the Queen of Sheba. Thank God there weren't any Japs in town. Just that one little Vietnamese slant-eyed woman, who General (HA!) Frank Jackson married. And everyone knows she was a whore anyway. Little slant doesn't deserve even a faker like Frank Jackson after all. Couldn't she find some little slant guy of her own? Had to steal one of ours.

And a few Chinks, full of college degrees. And Johnnie F. Haun's little adopted slant from Korea. The town was turning into the pits even before the Ring of Fire happened.

Cameron. Damned little bastard upstart. Literally a bastard upstart. When Gary married Laurie, he'd made noises about adopting the boy. She'd put a stop to that, quick enough. Bad enough that Gary had paid for the kid's food and provided him with a bed for fifteen years, just to have Laurie divorce him once her charming little woods colt was out of high school.

It was enough to make a person sick. She couldn't call in sick for her shift, though. Someone was bound to have seen her dropping those blasted snacks off at the church. Keeping up a good front and all that—people said it was just wonderful, the way that Veda Mae was bearing up since Glenna Sue drowned at the graduation party. Nearly half the kids at that quarry had been Krauts. Who was to say that one of them hadn't had something to do with it. And the police covering it up—they made up more than half the force, now.

If she wasn't a Methodist, she would cuss them all.

John's will had been a slap in the face to her. Leaving a full child's share to Glenna's widower, Ronnie Bawiec, just like the girl was still alive. Veda Mae had gone right down to the Probate Court and filed a challenge to the will. The old coot must have been out of his mind. Oxygen deprivation from the emphysema, or something. Ronnie and Glenna's kids had been left back home; he could just take his share and marry some Kraut, have more children. If Lucille Cochran let that will through probate, she didn't deserve the title of probate judge. Not that she did anyway. She'd been nothing but an assistant clerk in the county probate office before this happened. She was a probate judge like Frank Jackson was

a general. Not.

"Hi, Veda Mae."

Ardis Carpenter, blast her hide. Why did Gary have to go into partnership with Duck and Big Dog? Not that Garbage Guys weren't doing well, as a business. All three of them were making more money than they'd ever hoped to see, now that Duck and Big Dog had decided to go straight. Or, probably, sort of wavy, but not as crooked as they'd been before. They still took the chances that came their way, but they didn't go looking for them, any more.

They'd gotten Ardis a house, now. Down-time construction; up-time houses that came on the market were bringing more than they could afford. But compared to the shacks that Ardis had lived in most of the time her kids were growing up, they'd dropped her in the lap of luxury. With a Kraut woman coming in once a week to clean it up. Protecting their investment, probably. They'd kept the title in their own names and just given Ardis the use of the house. If they gave it to her, it would be gone—some smooth talker would con her out of it in no time.

Which would be no more than she deserved, the stupid, feckless, welfare queen, bringing up her kids on the taxes the government squeezed out of people who worked.

She needed coffee. She turned into Cora's. Half-full of Krauts. She backed out again, without ordering. She'd get some from the kitchen at the center. She bumped into Henry Dreeson, who was coming in. Knocked his cane out from under him. Well, she wasn't about to pick it up. Marrying a Kraut woman and still claiming to be the mayor of a decent American town. And now she had taken off on some damn fool errand having to with her first husband and left the old goat to take care of her whorish granddaughter's crew of orphans. Served the old goat right.

Letting them run schools. Bad enough to let them into the Grantville schools, without letting them run their own. Not just Dreeson's wife. There was a whole Kraut school out there, now, just beyond where the highway ended. Using the Kraut language. Teaching un-Americanism, probably. And another one going up on the other side of town.

"Good morning, Mrs. Haggerty."

Another Garbage Guy, a foreigner. Jacques-Pierre, his name was. Not a Kraut, though, so she waved back. He did the route with Gary, sometimes. A Frenchie, but spoke English. He'd spent time in London, growing up, when the Catholics made it hot for his family in France.

Sometimes it seemed that of all the people in Grantville, he was the only one who understood how Veda Mae felt about things. She was happy to be able to answer his questions—make him understand how things really were, these days, here in Grantville. Tell him about how her niece Kimberly was married to Andy Yost who was in bed with those Committees of Correspondence Krauts—Commies for a sure thing. And her cousin Nat making all those machines and things for the Stearns regime—Commies too, all of 'em.

She made it to work on time.

* * *

"I've never been so humiliated," Velma Hardesty unwrapped the silverware from the cloth napkin and slammed it down on the table. "In public. Just last week. My own father treated me like I was some kind of tramp. Someone to be ashamed of. At my own daughter's funeral. I'm not going to stand for it. And the kids, too."

Veda Mae Haggerty nodded. "Yes."

"I won't let those little bastards get away with it."

Too good to pass. "Actually," Veda Mae said in a precise voice, "only Pam is a bastard. You were married to Cory Joe's father when you had him. And to Tina and Susan's father, when you had them." Velma was so focused on her own injustices that she hadn't even been listening, Veda Mae noticed with regret.

"What gave him the right?"

"He didn't have any right, Velma. You're the mother. He's just a grandparent." Not, of course, that a mother necessarily knew better than a grandparent, Veda Mae thought. Take her ex-daughter-in-law Laurie, for example . . .

The waitress took their order before she could even verbalize a complaint, which didn't improve her mood.

Of course, they were at the hotel. The reopened and renamed Willard, right downtown, not Delia Higgins' pretentious new one. Neither of them was any longer welcome at Cora's, where the food was both better and cheaper. However, there were advantages. Willard Carson kept an eye out to see that his old friends were taken care of properly. It wasn't fair, Veda Mae thought, after he'd invested all that money, that Delia Higgins had opened a brand new one and would probably tempt away a lot of the high-end trade. It wasn't as if Delia needed the money. And Ramona married to that Kraut from Badenburg. She found some mild comfort in thinking that Delia had a daughter who was no more satisfactory than Viv. Though why Ramona should get a rich husband while Viv had to make do with a glorified gardener—no matter what you called teaching ag at the VoTech school, that's what Alden Williams was—and Viv had always behaved herself, while Ramona had that little bastard. . . . God didn't play fair. At least not on Earth.

"I think," Velma was saying solemnly, "that it was Meant. That you should be there to see it. To see how they treated me." She paused for a bite of her lunch. Fish sandwich on rye. Ugh.

"Meant?"

"Yes. By the Stars. You are Veda and I am Velma. Although you were born with a different surname, you were Guided to marry John Haggerty. So now you are Haggerty and I am Hardesty. It was the intent of Fate that our Paths Should Come Together. It's very Symbolic that you were at the funeral, too."

Veda Mae was not so sure about that. Symbolic, that was.

She'd been at the funeral because the other girl who died in the swimming accident at the quarry was her own granddaughter, which appeared to have slipped Velma's mind. Velma Hardesty was a trashy piece of work—always had been and probably always would be. Presbyterians weren't supposed to rattle on about things that were Meant by the Stars. That was astrology. Superstition. Not that Velma was in good standing at the Presbyterian church. Unlike Veda Mae, who was quite conscientious about being Methodist, although she sometimes doubted that the Reverends Jones appreciated that. Reverends—Mary Ellen, female minister. Veda Mae only took communion when the Reverend Simon had the service.

But Velma was right about one thing—it *had* been nasty of Ben to toss her out of her own daughter's funeral. No matter what else you could say about what Velma had been wearing, at least, spandex and all, at least it had been black. A lot of people didn't even bother to wear black to funerals, these days. Why right in her own family, for Glenna Sue's funeral, Laurie herself—Glenna Sue's own mother—

hadn't bothered to wear black. Just a plain navy blue dress. Marcie had worn a white blouse and a tan skirt—and when Veda had told her that it wasn't suitable, said, "Put it aside, Grannie. Just for one day. Save it for another day. Just once." Then she had changed places, to the other side of Gary.

When Gary had come to pick her up, he had been wearing a tie, but no jacket. She had made him put on one of John's old sport coats. It didn't fit him very well, but respect for the dead was respect for the dead. *She* had worn black to Glenna Sue's funeral. She had worn that dress to every funeral she had attended for the past twenty-five years. She kept it in a plastic zipper bag from the cleaner's, just for that. You needed to pay your due respects to the dead. No matter what you had thought of them when they were alive. Like Glenna Sue dancing with those pansies in Bitty Matowski's ballet. And Laurie encouraging it. She started to say, "And I told Ben Hardesty . . ." but Velma interrupted.

Not that Velma was wearing black this morning. Veda Mae thought that the other woman was getting a bit long in the tooth for bare-midriff styles; she'd definitely been letting herself go the last couple of years. The belly was distinctly pudgy, and there were love handles hanging over the low-slung Capri pants. Velma was waving one hand and proclaiming, "There has to be something that I can do about it." She ran her hand through her hennaed hair.

Veda Mae remembered that the hair had been bleached blond before the Ring of Fire. She also remembered Velma's first experiment with a down-time bleach concoction after the Grantville salons ran out of supplies. It had made Velma's hair so brittle that the first time she put her curling iron to it afterwards, a lot of it broke off, all uneven. Veda Mae had seen the results. She smiled briefly at the recollection. Then, somewhere, Ken Beasley's wife Kim had gotten a supply of henna. Veda Mae hadn't wanted Kim to use Kraut stuff on her hair, but she didn't want gray hair, either. Kim said that it came from Venice. Veda Mae couldn't see that Eyetalian goop was much better than Kraut goop, but she'd let Kim use it. She sneaked a glance in the mirror. It looked pretty good. Actually, it looked better on her than it did on Velma; the reddish color clashed pretty bad with Velma's complexion.

Velma had kept right on talking. ". . . and the judge, and the juvenile officer, and all of them," she wound up.

Veda Mae leaned forward. "It's a conspiracy. Listen, Velma. I know this guy, Jacques-Pierre Dumais. He works with Gary. He's a foreigner, but he understands what we're all being put through by Mike Stearns and his cronies. I know that Stearns is your cousin, but if some of the other UMWA men like my husband John had taken a stronger stand when all this started, they could have kept him from taking over. The way he makes up to the Krauts is disgusting. It really is. Putting Grantville under this Kraut, first as Captain-General and now as Emperor. As if anyone thinks this USE will last. Talk about jerry-built. People must have been crazy to adopt that sick excuse for a constitution."

Velma answered, a little doubtfully, "I think the emperor is a Swede. I saw that on TV. And Mike hasn't done anything to me. He and Becky invited me to their wedding. It's Dad. And the Logsdens. And those ungrateful kids of mine. Otherwise, you know, it could all have been Meant."

Veda Mae felt vaguely betrayed that Velma didn't share all of her own grudges. But what could you expect? A lot of the time, she was probably too drunk to notice what was going on. Or in bed with some man. If not with two, if a person could believe some of the stories that went around. Which a person probably could. According to Joyce Burke, she'd actually had a boob job, up-time, before the Ring of Fire. Wonder who paid for that? Probably some guy who got to play with the boobs!

At least Velma didn't sleep around with the Krauts, not like some people Veda Mae could name. Naida

Carpenter, for one. Ardis's daughter. She was married to one, and Big Dog and Duck hadn't done a thing about it. Well, Ardis's other girl had been living with one of them until she and the kids burned to death in April. The gossip columnist in the paper, the one who went by "Roger Rude," had hinted that it was arson and the Kraut had done it. Veda Mae wouldn't be surprised. Served Mandy Sue right. And her kids were probably better off dead. Veda Mae had gone to the funeral, though, wearing black, since after all it was the sister of Gary's partners being buried.

But Jacques-Pierre had said that it was her religious duty to offer Spiritual Comfort to Velma—that she should talk more about the things that were bothering Velma. Not so much about the things that were bothering herself. She listened patiently as Velma returned to her favorite subject: Velma. And the injustices that Velma suffered. And how misunderstood Velma was. And how very, very much Velma resented the fact that her daughter Susan was ungratefully depriving her of a decent standard of living, which she could easily provide with all that money she had made on those investments through the Barbie Consortium.

Veda Mae listened for quite a while, throwing in comments, occasionally, about Delia Higgins' Kraut son-in-law, Kraut lawyers who drew up miserly financial contracts when you rented out your upstairs rooms, and Mike Stearns' Kraut wife.

Velma frowned. "Becky is Jewish. I think. I'm sure. I went to the wedding."

"Becky," said Veda Mae, "has to be a Kraut. No matter what she claims to be. Mike met her right here in Krautland, didn't he? She talks the language, doesn't she?"

Velma looked vaguely puzzled, but it wasn't something that was really worth arguing about. She went back to talking about Velma. And money. And Velma.

When it came to money, at least, Veda and Velma were in harmony. Someone had done them out of their rightful share of something. They had a lovely chat about corruption in the Grantville court system. Finally Veda Mae said, "You ought to meet Jacques-Pierre. He can tell you how it all connects together. He understands the problems that we're having. He really does."

As she finished up her carrots, she cast around for some words that Velma would understand. "He can offer you Spiritual Comfort. It was probably Meant that he's come here to Grantville."

* * *

Jacques-Pierre Dumais flinched inwardly at the company he was keeping. However, *Madame* Haggerty had a grandson—well, a step-grandson, to be precise—on Jackson's staff. *Madame* Hardesty, to whom she had just introduced him, had a son on the personal staff of Colonel Jackson, assigned to the office of Don Francisco Nasi. The two young men were said to be friends.

In this summer of 1634, discontent among the up-timers might be the best advantage France had. Possibly even the only one. *Mesdames* Hardesty and Haggerty were not pleasant company, but people had survived worse.

Reminding himself of the tribulations undergone by Job, he smiled and shook hands.

* * *

Sunday dinner at Grandpa Ben's. Which would have been okay, Susan thought, if only Aunt Betty wasn't here again.

"Mom's collected herself some new guy," Susan said a little sulkily. "Younger, with good abs. I saw them on the street outside the Willard just yesterday. Talking to Glenna Sue's grandmother."

Ben frowned. "Susan, you shouldn't . . ."

". . .'speak about my mother like that.' I *know* the rigamarole."

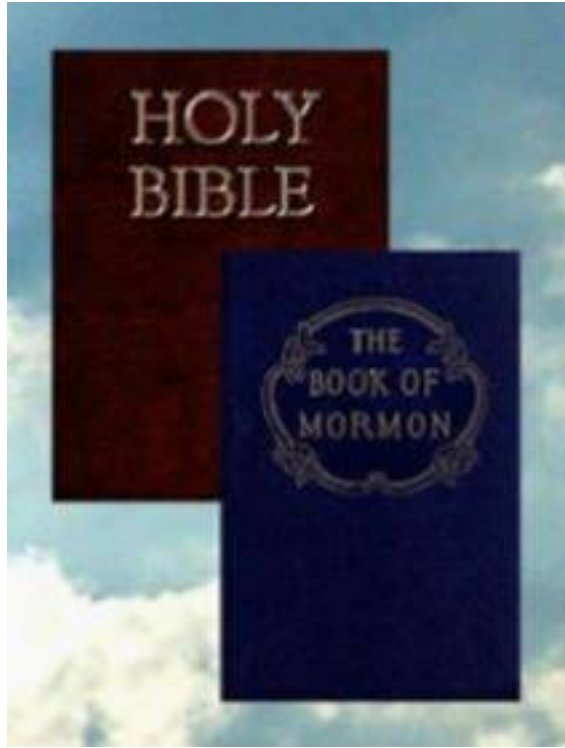
"Susan, please," Pam said.

"Who is he?" Grandma Gloria asked.

"Don't know. Never saw him before."

Betty Wilson drew in a breath, reminding herself that sometimes it was harder than others to put the best construction on everything. Especially when it came to the activities of her sister Velma.

"Then you don't know that he is one of Velma's 'guys,' Susan."



Betty bowed her head briefly. Most of the time it was impossible for her to put the best construction on Velma's activities, no matter what the Bible and the Book of Mormon admonished her to do. *Well, all of the time.* Nevertheless, at a minimum, she could make herself *act* like she put the best construction on everything. The least she could do for Velma's girls was to be a good role model. Heaven only knew, they needed one. So.

"You don't even know who he is. You just said so yourself. And if you can't say something nice about a person, don't say anything at all."

Susan and Pam just looked at one another. Aunt Betty was being very Aunt Betty-ish. Again.

"Why don't you just say what you think? You *know* that you're thinking the same thing we are."

"You can't know what I'm thinking."

"I sure can. Even when you're acting all pious and righteous, and don't pretend that's not what you're doing." Susan looked at the others. "Mom's up to something again, and we're all going to end up being sorry we know her. Again."

She looked at Pam. "I don't know about you, but I am so sick and tired of being Velma Hardesty's daughter that I could spit."

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A Pirate's Ken

Written by Iver P. Cooper



The lookout squinted. In the east, a horizon-hugging bank of clouds glowed red, heralding the imminent sunrise. In the west, the sky was a deep azure, with only a few stars still glimmering. Below his perch was a dark skeleton of masts and spars.

He turned to the north. He saw naught but water and air, but he knew that somewhere beyond the horizon lay the shimmering sands of the Costa de la Luz, the Coast of Light.

At the periphery of his vision, a flash of white caught his eye. It was gone before he could snap his head around. A phantasm? A wave breaking? He wasn't sure. There it was again!

"A sail, a sail!" he cried. "East northeast. Hull down." Whether the sighting meant profit, or peril, or a measure of each, he knew not.

By now, the lookout had a sense of its movement. "Heading west north west."

On the deck far below, Captain Jan Janszoon smiled. "It appears that this cruise won't be boring, after all." He pulled out a spyglass—it had been taken off a Venetian prize, and was worth its weight in gold—and made his own observations.

The mystery ship was maintaining its westward course, edging closer to Janszoon. It didn't turn, either to flee, or to reach Janszoon more quickly. Clearly, it hadn't detected their presence. No surprise, that; Janszoon's vessel had furled its sails at the first hint of dawn.

Janszoon studied the visitor. "Merchanter," he announced at last. "A big one." The men whooped.

"Set sail, just the lower courses for the nonce." That would make it harder for the prey to spot them, but they would also make less speed. "Vargas, we head north." The helmsman nodded. That would give them fast legs, and, given their windward position, it would be difficult for their prey to escape to the west. "Oh, and Pieter, raise the Spanish flag. Who knows? They might be idiots and come ask us for news."

Time passed; the ships converged. The merchanter seemed to sail well, close-hauled, which implied she had a full load. More good news.

At last, with the range down to perhaps ten miles, Janszoon saw a reaction. The trader put on every scrap of canvas it had, even its studding sails. Plainly, it didn't think he was a countryman, come for a friendly chat. What a pity.

Putting on that much sail was dangerous, too. The strong southwesterly wind of the Gulf of Cadiz, the *vendavale*, could knock down a crowded mast.

Clearly, the merchant hoped he could escape to the open sea. Janszoon would not allow it. "Make fighting sail," he commanded. "And lay us four points to starboard." That wasn't the quite the shortest interception course, but it would make

it more difficult for the prey to clap on the wind and get on Janszoon's weather side, where it might more readily give him the slip.

Soon they were close enough to hail it. "From whence came ye, and where are you bound?"

"From Venice, bound for Cadiz. And you?"

Janszoon was delighted by the answer. The target was clearly a Spaniard. "From the Sea, and bound for Hell!" he shouted. "Pieter, show them who we are."

Pieter grinned. He knew the drill. The false flag came down, and two new ones went up. The first was the standard of the Prince of Orange, the leader of the Dutch people in the fight against the Spanish. The second would give them even greater pause.

The feared emblem of the Sallee Rovers, a gold man-in-the-moon on a red background, soon fluttered above the head of Jan Janszoon . . . Murad Reis, the infamous Renegado. On the deck of his xebec, his corsairs ran out their cannon and raised their muskets, ready to do battle if the merchant refused to yield.



Janszoon was Haarlem born and, like many of his fellows, had taken to the sea at an early age. He disdained the merchant life from the beginning, choosing to serve on one privateer or another, and thus mixing patriotism with profit. In 1618, while enjoying some R&R at Lanzarote, in the Canaries, he was snagged by Algerian raiders. Learning of his experience, the captain, Suleyman Reis, gave him the choice of being sold on the slave block or turning pirate and serving as one of his officers. To Janszoon, it wasn't a hard choice at all.

Shortly thereafter, Janszoon converted to Islam. Whether the conversion was genuine or merely to improve his employment prospects, only he knew. Janszoon also married a Mudejar, that is, one whose family was one of those evicted from Moorish Spain. From Cartagena, to be precise. She had good connections, not only in Algeria, but also in Morocco. Janszoon was a conscientious man, in his own way, and despite the new marriage continued to send money to his first wife, back in Haarlem.

The premier Moroccan pirate base was Sallee, on the Atlantic coast, only fifty miles from the Straits of Gibraltar. It wasn't long before Janszoon decided that his job opportunities were better there. They were. Soon after his arrival, the Sallentines declared independence, and established a council of corsair captains to govern themselves. Janszoon had the traits most valued by the corsairs—intelligence, daring, and luck—and found himself elected their first Admiral. The sultan of Morocco laid siege to Sallee, was repulsed, and then "confirmed" Janszoon's appointment. Janszoon shuttled back and forth between Sallee and Algiers, navigating the treacherous politics of both cities. He had returned to Sallee fairly recently, and had decided to lead a corsair sweep—as much to maintain his reputation as for the actual revenue involved.

The warships of the Sallee Rovers were small, because a bar in the harbor forced deep draft vessels to unload if they wanted to enter. However, size wasn't everything. A rover was packed with cannons and experienced fighters, and its hull was carefully maintained to maximize its speed. The Spanish ship had cannon, true, but it was debatable whether its crew even knew how to fire them. And most of its hull space was taken up by cargo.



Would the Spaniard flee, fight, or simply surrender? Further flight to the northwest was clearly hopeless; he would have to swing wide to avoid the Taraf al-Gharb, the Cape of the West. What the English called "Trafalgar."

The bow of the Spanish merchantman started to swing away. Ah, they meant to head north, beach themselves on the coast, and hide in the pine forests beyond. Janszoon gave a hand signal. Shots rang out, and the Spanish helmsman crumpled. A few moments later, the merchantman struck. The battle was over.

* * *

The pile of loot on the main deck grew as the corsairs emptied barrels and chests from the hapless merchant ship and stripped valuables off its crew and passengers. This public collection was necessary, for every pirate risked life and liberty, not for a mere wage, but for a share of the spoils. The corsairs had to be sure that they were each getting a fair share. Ten percent of the loot went to the government, to support the maintenance of the defenses; forty-five percent to the outfitter, as reimbursement; and the remainder to the officers and crew. Each officer received three shares, each cannoneer two, and common seamen one apiece.

Of course, the real loot were the crew and passengers of the Spanish ship. They would be sold on the slave market, and the proceeds divided according to the pirate rule. The rich or well-connected captives would be ransomed, and the poor ones would spend the rest of their miserable lives in servitude.

Janszoon's eyes were drawn to one of the treasures, a figurine which had been carefully packed in a padlocked chest. Clearly, it was considered to be of great value. It puzzled Janszoon greatly. It reminded him a little of some of the statuettes of the African tribes, because of the exaggerated feminine endowments. But it was clearly a depiction of a Caucasian, and the workmanship was much finer than that of any African artifact he had ever come across. Was it Dutch? Venetian? Or something even more exotic. Perhaps it was from the Mughals, or the Cathayans?

And what material was it made out of? Janszoon and his officers debated the issue. It certainly wasn't a metal. But neither was it glass, or wood, or horn, or ceramic. Janszoon finally decided to simply ask its erstwhile owner to provide a full explanation. The owner had an arm around the shoulders of a lad with similar features. A son or nephew, no doubt, who, but for this disastrous misfortune, would have joined the family business.

He pointed to the man. "Come here. We found you holding this chest, did we not?"

"Yes, sir. I meant no disrespect, sir."

"What is your name, and how and where did you get this little fancy?"

"My name is Sergio Antonelli, and I am a citizen of Venice. I bought the figurine there, but it comes from a town in Germany called Grantville."

Janszoon frowned. "Grantville? I have heard of it. Another fabled land, like the kingdom of Prester John."

"Oh, there is no doubt of its existence. There is a delegation in Venice right now. They have been explaining their alchemical and medical arts to our own professore, and trading for zinc, and glassware, and alcohol. They aren't magicians, but the Council of Ten is convinced that they are, as they claim, visitors from the America of the future. And you surely know how good the council's spies are."

"And this figurine? What is it made of?"

"The material is called plastic, and the Americans made it alchemically. It will be years before they can make more of it, however. They don't have the right equipment anymore."

"How did this artifact come into your hands?"

"I bought it from a fellow Venetian, Federico Vespucci. He actually went to Grantville two or three years ago. He is my

second cousin. He sold most of the figurines, but we kept a few as an investment. Most of the buyers were collectors, and they will take their purchases off the market. Which meant that the price of the few resalable ones would go up. Way up."

"So why were you carrying it on a boat to Cadiz?"

Sergio sighed. "I had a new business idea—one that needed a license from the king of Spain. I needed an extraordinary present to ingratiate myself with the royal family, and this plastic statue seemed perfect."

"So, these men of the future. Do their arts include the arts of war?"

"I have heard that they have muskets which can fire very quickly, and that they used them to destroy a Spanish army. I have heard that they have supplied cannon to the king of Sweden, with which he defeated an Austrian force. And I have even heard, although I only half believe it myself, that they have used a flying fort of some kind to turn back the Danish fleet from the coast of Germany."

A sailor cuffed him. "Don't speak nonsense to the admiral or I'll cut out your tongue."

Janszoon held up his hand. "It may not be a nonsense. I heard something about a flying machine from a fellow Dutchman who sailed with the Algerines. I thought he was just having a joke at my expense, but perhaps I misjudged him . . . May Allah have mercy on his soul.

"So I would like to know more about Grantville. Have you been there? Or met any Americans?"

The merchant hesitated.

"If you lie to me, I will know it," Murad Reis declared. "And I will make you wish that you were in the hands of the Spanish Inquisition."

The merchant shuddered. "No, I haven't, but I have met those who have, and have questioned them closely. And I have been in the part of Germany, it is called Thuringia, where Grantville now lies."

"And do you know their language?"

The merchant chose his words most carefully. "I speak the English of our own time. I have heard that visitors from England have been able to speak to them, but that the 'up-timers' have many words which we do not, and that some familiar words have strangely altered meanings.

"Also, it appears that many of them have now learned German, or Latin, and so we can converse with them in those languages as well."

He waited for another question. The wait was a long and nerve-wracking one, because Murad Reis had been given much to think about.

"When I take my ships upon the sea, there is both danger and opportunity. The same is true of dealings with this Grantville, but the risks and rewards are a hundredfold greater. But if don't act, I—and the Republic of Sallee—will ultimately lose to those who make the gamble.

"To act as I must, I must have information, and it must be from someone I can trust. So, I will release you."

The merchant brightened. "Your Excellency, may it please you—"

"I will release you . . . conditionally. You will guide my son Cornelis to Grantville and see to it that he comes to no harm, and meets those in a position to aid us. I will hold your son as hostage in my palace, but he will be treated as a guest and not worked like a slave. When you return my son to me, I will return yours to you, and I will set you both free, with many gifts.

"You will have two years in which to complete the journey. If my son doesn't return, or if he doesn't reach this Grantville, then your son will suffer the consequences."

"What . . . consequences?"

"Use your imagination. Then multiply by ten."

* * *

Murad Reis looked fondly at his son. "Dear boy, the future of our family may well depend on how well you conduct yourself in Grantville."

"I will not disappoint you, Father, Allah willing."

"As soon as we land, visit the tomb of Sidi Ahmad Ibn Ashir, and pray for a safe and successful trip." Ashir was one of the patron saints of Sallee.

"How long will I have to prepare for the journey to Grantville?"

"I can give you a month. Learn this merchant's strengths and weaknesses, as you will be dependent on him. Have him teach

you English and polish up your German."

Janszoon paced the deck, thinking. "I will have you sail with him to a Dutch port." Sallee, at this moment, had a treaty with the Dutch Republic. That didn't mean that Sallee Rovers wouldn't attack a Dutch ship if it seemed delectable enough. For the sake of propriety, if they did so they would fly the Algerian flag and take the captives to Algiers. As a matter of policy, Sallee and Algiers were never both at peace, simultaneously, with the same European power.

"In Holland, be sure to go to Haarlem and visit my first wife, I will have gifts for you to give her. And our daughter, Lysbeth. Your older sister. Remind her that she has a standing invitation to come visit me here in Sallee.

"Oh, and find out if they have any news of your older brother, Anthony. Is he still in New Amsterdam? Have he and Grietje had any children yet?" Anthony Jansen Van Salee was Moroccan born, and had married Grietje Reyniers in 1629, on board a ship bound to America.

"Then make your way to Grantville. Learn how they build their ships, how they cast their cannon. Aye, how they fly!

"I will give you a letter which you pass on, if the circumstances warrant it, to this Michael Stearns. It will offer him a full alliance if he agrees that he and his people will convert to Islam."

* * *

Cornelis Jansen Van Sallee thought it was a pity that the merchant had not been to Grantville personally. He really had one question of his own about Grantville. It wasn't about shipbuilding, or cannon casting. It was . . . did the women of Grantville really look like this—what was the name the merchant gave the figurine? This . . . "Barbie"?



* * *

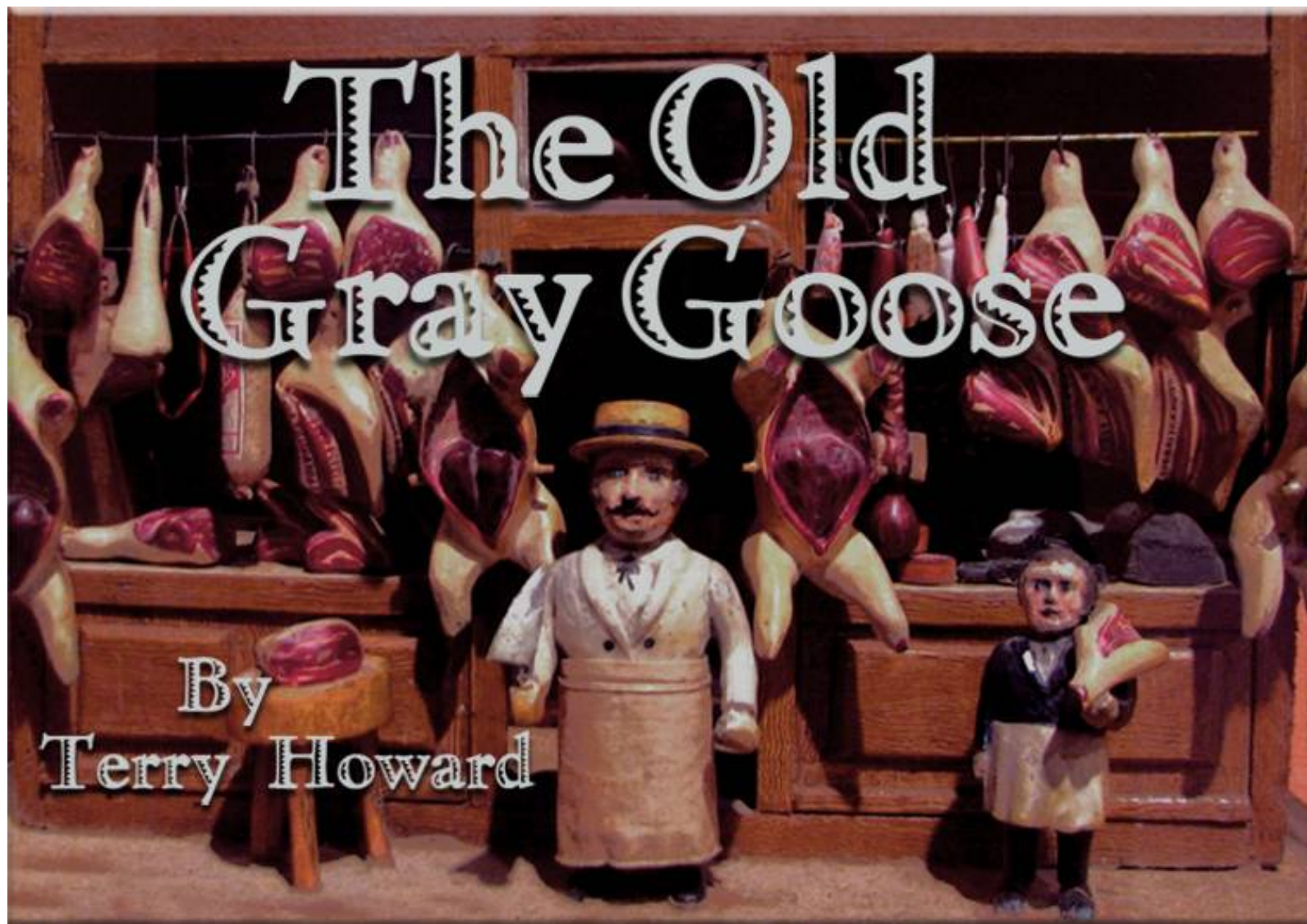
Author's Note:

In our timeline, Jan Janszoon (1575-1641) became Admiral of Sallee in 1619 but moved to Algiers in 1627. I have "butterflied" his life so that he is back in Sallee by 1634.

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The Old Gray Goose

Written by Terry Howard



Grantville Thanksgiving, 1635

"Why are you not happy, Herr Benito? We have a half day off." The new butcher's helper, Hans Knefler, glanced over at the man he'd been assigned to work with out of the corner of his eye as they walked home from work. Benito never looked particularly happy to Hans.

"Kid, if we didn't work in a grocery store, it would be a full day off. You know all about Thanksgiving right? The Pilgrims, the New World, the Indians, yadda yadda. Big deal! Back up-time, we used to call it Turkey Day. Almost every family cooked one. Shoot, I knew a family of vegetarians and even they cooked a turkey. On Thanksgiving we ate turkey and watched the Macy's Parade on TV. And then we could watch football. All day. I loved it."

"They all had Spanish turkey?"

Benito snorted. "Not at these prices. Back then we had big farms that raised thousands of them and shipped them out dressed and frozen. Benito paused for a moment. "Man alive, I miss home. Really I do."

Hans asked, "Are you having turkey?"

"What do you think I am? Rich?" Benito countered. "The price is ridiculous. They're imported from Spain. Only reason Spain has

them is because someone brought them back from Mexico. Maggie O'Reilly had some young toms she sold us at the Spanish import price—and I mean to tell you she was smiling when she did it, too.

"We used to sell it retail at a dollar, dollar ten per dressed pound. If nothing happens to her layers, Maggie will die rich because she let her little girl breed turkeys for a 4H project. I hear a lot of people went hunting this week, but I don't think there were all that many wild turkeys to begin with."

Hans was thinking Benito was whining rather a lot for someone who had such a good job and nice house. But then Benito snorted a half laugh.

"No, kid, we're having goose and dressing. Goose is fine. I can't afford turkey. I won't pay that kind of money for one and I probably won't live long enough for the price to come down."

* * *

Benito knew he was feeling sorry for himself. Heck, he was probably wallowing in self-pity, come to think of it. On the other hand, though, he certainly hadn't asked to get stuck here. Everything was different, seemed like. Food, clothes, prices. Walking all over the darned place. He missed his car. He missed the food he was used to. And he missed the old Thanksgiving celebrations.

Until someone started importing corn, Benito's wife made a white bread dressing when she baked fowl.



Benito hated it. Now she bought dried corn and ran it through the blender to get meal. Which didn't make a lot of sense to Benito, since there were millers all over the place. The fact was, she'd asked for corn thinking she was getting corn meal from the bulk counter at the store. It never crossed her mind that someone might want whole corn to make hominy so she didn't say corn meal or corn flour, as the down-timers were calling it. She was too embarrassed to take it back. Now she liked the finer meal she got out of her blender better than what the store sold. They only had cornbread on special occasions, even though it was getting cheaper now that they could import dried corn from Italy.

He missed cranberry sauce, the jellied kind, from a can. They'd only had it on Thanksgiving. He really didn't like it all that much. Most of it was thrown out every year but it just wasn't Thanksgiving dinner without it. Cranberries were just one of the many things that would never again be the way they should be.

Here he was—past retirement age and then some—working full-time and then some. It certainly wasn't what he'd expected to be doing when he was sixty-six—darn near sixty-seven.

In the first year after the Ring of Fire, when everyone was scrambling to get through the winter, he pitched in like everybody else. The government tapped an experienced meat man, Mark Burroughs, to run part of the food supply project. Someone had to cover the meat counter at Johnson's grocery store. So Benito went to work for the interim while Mark was on a short term-leave. That was over three years ago. With Mark being part owner in "Ice and Slaughter," along with being the government meat, health and safety

inspector, there was no way he was ever coming back from the leave of absence. The job was Benito's for as long as he wanted it. Without a social security check, he needed the income. Which was another thing that he missed, for sure. No check. Had to get a job. No wonder that old bat, Veda Mae Haggerty was so bitter. She was in the same boat.

"I'm lucky Mark ain't ever coming back," Benito mumbled. A meat counter was about all the physical labor he wanted to handle these days. Besides, without cable TV what would he do with himself, anyway?

"What did you say, Mister Genucci?" Hans asked.

"Oh, sorry, kid. I was just thinking about how things used to be."

"It really must have been something, living up-time I mean."

"Well, yes and no. It's kind of odd. The big difference in the job, other than the prices, is the return to paper wrapping. Cellophane and Styrofoam are gone. All the fresh meat stays iced down in the glass-front butcher's counter until it gets wrapped in paper and sent out the door."

Benito continued chatting away. "Of course, there were things you can't get at all any more, like lobster, king crab, and shrimp. And there's a long list of things you can only get once in a while. Take veal. When we have it, it's real veal. Someone's cow drops a still-born calf and the meat inspector passes it. It's not some box-raised milk-fed yearling steer, like veal used to be.

"We still get mostly beef and pork, always did. What's weird is that some of the pork is wild boar. About the only thing that hasn't been in our meat counter is dog and cat. Though, I wonder if a couple of the rabbits we sold weren't off of someone's roof, to tell the truth. We even sold squirrels once or twice.

"The quality is what it is. It isn't like you can call the supplier and raise a fuss. Hell, we should be thankful we got a supplier," Benito said. "Shoot, for that matter we should be thankful to be alive and I should be happy to have a job instead of griping about having to work."

"You would have a job, Mister Genucci. They need you."

"Thanks, kid, but I know better. I'm lucky Mark Burroughs' left to help set up a slaughter-house or I'd have your job instead of mine." They'd reached the turn to Benito's house. "Well, here's where we part company, kid. See you tomorrow. Remember, you're going with me to the slaughter house in the morning so be here at a four thirty."



The goose was good. Benito had picked out the best of the lot, after all. The stuffing was perfect. His wife had something she claimed was cranberry salad made with dried berries from Poland. They might have been cranberries—he couldn't tell the difference—but it just wasn't cranberry sauce. Still, he had to brag on it. And there was no football on the tube. *The Sound of Music* just was not an acceptable substitute.

He went to bed early.

* * *

The alarm went off. It was four in the morning. Again! Benito shut it off so his wife could get another three hours of sleep. His clothes were hanging on the back of the bathroom door so he didn't have to rummage around in the bedroom. At a quarter after four he was out the door.

Hans was waiting at the street corner and they took the long walk out to the slaughter-house and got there about five. What was now "Ice and Slaughter" used to be a big old barn. Now it held the cold storage along with the ice-house, the dairy and the ice cream company. They built a slaughter-house just up hill from the barn and a smoke house, downhill, off to the side.

Benito happened to be there when Slick had pitched the idea to Mark.

"Hey, Mark. I've got an old antique hand-cranked cream separator tucked away in the barn," Slick said without preamble, right in the middle of the conversation Mark was having with Benito about the meat counter at the store. "Got an old commercial ice maker stashed in there too. It'll need its Freon recharged. They got some down at the body shop . . . well, I guess it ain't really Freon, but they tell me it will work. Anyway, I was told you would have to sign off on it before they use it. I want to turn part of the barn into cold storage for milk."

"That's a mighty big barn you've got. How are you going to do turn that drafty old thing into cold storage?"

"Well, the back half of the lower level is underground. I figure I can stack hay bales three deep across the middle and fill the floor overhead with straw. That should hold a couple of semi-loads of stuff."

"Not big enough. But if we stacked the entire outside of the barn with three or four bales of straw and covered it with tarps, we can turn the whole thing into a freezer. If we can find enough straw bales. They'll cost a bundle, that's for sure."

"Think that would work? There isn't that much milk to keep cool."

Mark's eyes lit up. "No, but there's meat too. How would you like to be part owner in a slaughter-house?"

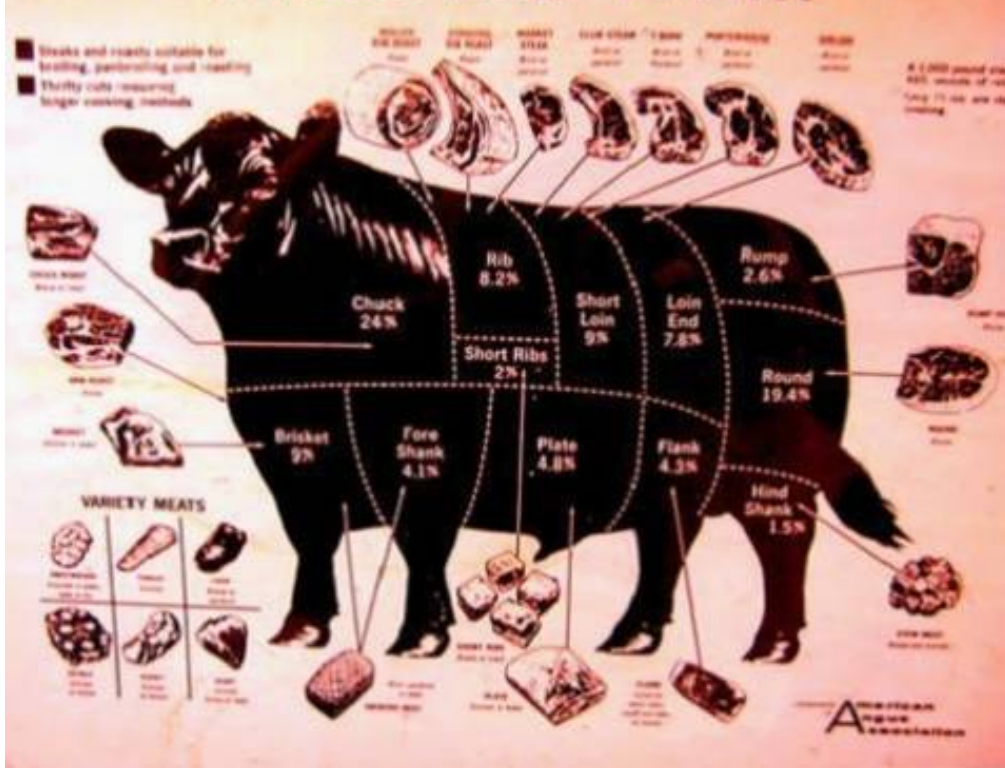
So they'd gone and done it. Somehow. Benito didn't like to think what that straw had cost. If it was straw. For all he knew, it was pine needles doing the insulating. Or even sawdust. But it worked. The second year they boxed in the outside. The loft was filled with loose straw and the ice maker set into the wall with the back side to an office to so the heat off the condenser helped keep the staff warm in the winter. Mark figured the basement would freeze and the second floor, which had its own ground level entrance at the back of the barn, would make a refrigerator. They ran the ice maker 24/7 until they had enough ice so the barn stayed cold.

Benito laughed as he and Hans trudged up the hill to the old barn. "There was some question as to whether the ice maker Slick had would make enough ice for it to work. It almost worked too well. They had to scavenge foam board out of someone's pole barn to hang on the ceiling of the lower level to keep the second floor from freezing up too."

"Herr Benito, why do you call him Slick when that is not his name?"

"Back when, he always had a scheme going. He was always trying to pull a fast one. He'd buy junk and put it in the barn and try and sell it as antiques. That's why he had the cream separator and the ice machine to begin with. Good thing it worked, I guess. Well enough that Mark's doesn't want his old job back."

ANGUS BEEF CHART



Oh, there were people who griped about conflict of interest and profiteering, over Mark being part-owner of the slaughter-house. But where were they when there wasn't an ice-house? Mark, Meryle Grooms, Slick and some others got the ice- and slaughter-house up and running at their own expense when it was needed most. Benito figured they deserve what ever they got out of it. Some people can't stand seeing someone else get ahead.

"Any way, the meat grinder and the band saw from the store found their way out here. When Mark wanted them, Old Man Johnson said okay, as long as we got first dibs on meat. That's why I have to walk out here every morning to look over what they've got hanging in cold storage. That will be your job just as soon as I think you're up to it. At least we get to ride down to the store with the delivery wagon.

"Everybody knows Johnson's has the best meat in town. It don't matter anymore that they we're the smallest of the three groceries. Having the best meat will keep us in business. Though I never thought I'd see the day wild venison would be in the meat-case next to goat and sheep."

The aged quarters of the day's stock were loaded on the delivery wagon with the morning's ice while he watched and Hans helped. Then they rode to the store. "Good morning, Mister Genucci," Carl greeted him cheerfully.

Benito made a sound somewhere around a snarl that had no clear meaning. He hadn't had his coffee yet. While the ice and meat were unloaded, he'd have a free doughnut and a cup of coffee with the baker.

When the ice was in the meat counter and the meat was in the walk-in refrigerator, Benito would be ready to start the day. The ten-by-twelve cooler, which could hold about two days worth of meat, would be about half full. Anything left in-house on the third day was sold at or under cost to the relief agencies. They expected cheap meat and they got it. If there was very much meat left on the third day, Benito knew he wasn't doing his job.

The baker had a cup of coffee and his favorite roll ready for him. "Mornin', Benny."

"Mornin', Pigtails." She hadn't had pigtails since they were in grade school, when he was last called Benny by anybody but his wife. She giggled like she did every morning at the name.

She had been Johnson's last baker. When she quit to open a pizza place with her husband, the store went to having their bakery stock delivered. A couple of weeks after the Ring of Fire, Pigtails showed up one day and announced that she needed a key to get into the store at three o'clock in the morning to bake bread.

The startled manager said, "What?"

"I need a key to get into the store at three o'clock to bake bread. You sure aren't going to get any more bread deliveries and I know good and well you don't want to be here at three to let me in. So I need a key."

"Three o'clock in the morning?"

"The restaurant down on the corner wants three dozen mixed doughnuts and four loaves of bread at six o'clock. They'll go stale

overnight, so I need to be here at three. We were only making a half a gross of loaf bread a day when I quit back in '78. But we're the only grocery store that still has a bakery, so we'll be selling to the other stores until they get an oven up and running."

The manager asked the whirlwind, "Who are you?"

"I'm Carlina Marcantonio. Mr. Johnson told me if he ever needed a baker again, I could have my job back. Well, you need a baker. If you don't believe me, go ask Old Man Johnson himself. Before you do, pull half of your sugar and flour off the shelf and don't restock it until you've got a supplier. We'll make more selling bread. While you're at it, pull the cinnamon and half the baking powder. "I'm going to start cleaning the ovens."

The manager did indeed call Leroy Johnson. "Carlina? Yeah, I told her if I ever needed a baker she could have the job back. I was joking. No, you will not tell her to go home. You give her whatever she wants for as long as we've got it."

After that she ruled the roost in her corner of the store. Benito asked her once, "You've got the pizza place, why are you down here baking?"

"Benny, right after the Ring of Fire, the only thing for sure was there wouldn't be any more deliveries. I thought a job in the grocery store might be a good idea. I tried baking bread at the restaurant, but the ovens weren't big enough. I can bake more here."

The store was lucky they still had the bakery. The oven and fryer hadn't been used since she quit. There had been talk of ripping them out, but with volume slipping year by year, they didn't need the room. About the only thing ever proposed for the space was a small video arcade to siphon a few quarters out of kids' pockets while their mothers shopped. Old Man Johnson put his foot down. He remembered when an arcade meant gambling and wouldn't hear of it.

About the time Benito finished his coffee, the birds arrived from the dresser. He checked them in. It wasn't just chickens anymore. Ducks, geese, game birds—some of them quite small—all found their way onto the ice in the case. Benito didn't like seeing the song birds. They were so small and it just wasn't right. But the price they got for them and the fact that there never were any left said all there was to say on the matter.

The plucking business annoyed Benito. What that man was paying—wasn't paying was more like it—the ladies he had plucking fowl for him half the night was criminal. But they could come to work after the children were put to bed and be home by breakfast. When they slept was their problem.

By the time he had the birds checked in, all the stock left over from the day before was out on the ice and the butcher would start filling in the empty spaces behind the glass in the meat case.

By seven, the meat counter was full. By eight, Elisa, Benito's wife, arrived to handle morning sales. She was a great hand with customers. She had picked up German in nothing flat.

Elisa's working was another thing Benito didn't like about this "Brave New World." She took the job during the first frantic year. It was her only job since they married. He always insisted she had a full-time job as a mother and wife. When she announced she was going to volunteer, he objected. She told him to can it. "Everybody else is helping out. I can too." So he got her a job down at the store. The idea of some other man bossing his wife around just did not sit well with him.

Official store hours began at eight. Their wholesale customers, three eateries which served breakfast, and others, had been stopping by for doughnuts and muffins since six. There would be more commercial customers when they started preparing for lunch.

Some people who bought muffins also bought a cup of coffee after beans started arriving in Grantville. If you wanted coffee or milk or something else to go, then you brought a container. No more Styrofoam cups. No more banana muffins, either. Benito missed those.

At eight, the housewives and cooks or their helpers would start arriving, some with small children in tow. Everybody was off to work or school and the day's provisions needed to be purchased. One cook for an up-time family bought seven eggs on one day and eight on the next. She brought an old egg carton with her each day to get them home safely, except on Saturday. Then she brought two because she would be buying seventeen eggs. Benito knew the family had insisted they would buy a week's supply of food at a time, so she would not have to walk to the store each day and tote everything home in a canvas bag. It never worked out. She always forgot something or ran out or, or, or—. She was there every day and would walk each and every aisle chattering away in some strange dialect with three other ladies. Elisa told him, "It's her way of getting out of the house to socialize. Women and shopping, Benny, some things are always the same."

Elisa worked from eight to twelve each day, chatting with the customers while they picked up a quarter pound of bacon, and "How is Tomas' gout this morning." A half pound of ground sausage, "Is your cough any better?" A roast for dinner, "I see you got down to the beauty shop for a hair cut." After the mad rush to survive was over Elisa kept working.

Benito told her, "I think you ought to quit."

"Forget it," she told him. "I like working."



Friday was fish day. There was more ice and less meat on the wagon on Fridays.

"Mr. Genucci, why do we not stock more fish? We sell out every Friday around noon, it is not like other days when there is fish to closing that we have to sell cheap the next day," the butcher's helper asked.

"Kid, we put out all the fresh fish we can get. The customers prefer it. Salted, dried, smoked or pickled fish will do, but they want fresh fish if they can get it. There's only so much available and we split it up even with the other grocers. At first the catfish only sold when there was nothing else. Now it's the first to go."

Along with carp, catfish did very well in the fish ponds that sprang up during the first frantic year. They were the bulk of the Friday fish. The rest of the week got whatever the fishermen brought in. The preserved fish arrived in barrels and were sold with the bulk food, so they weren't Benito's worry.

The birds arrived, so Benito checked them in. Then he told the deliveryman, "You tell that cheapskate boss of yours I only want a half order on Fridays. We've been through this before. He keeps trying to creep the Friday count back up. If I've got more than half a dozen birds left over in the morning, you'll be taking some back with you."

"The boss won't like that."

"So tell him to quit oversupplying me."

By then the fish were out on the ice along with a selection of red meat and the fowl. Benito looked the counter over and then wandered over to the barrel aisle to have the same conversation with the bulk food manager he had every Friday.

As the shelves emptied out, half of them were taken down and put in storage. Now there was a row of barrels and crocks and bags behind a counter. You told a clerk what you wanted and the clerk scooped it out, weighed, measured or counted it, then poured it into your container and a tab was taken to the cashier. Milk, cream, butter, cheeses, beer, wine, whiskey, cabbage and turnip sauerkraut, a variety of flours, along with Grantville Extra Fine Flour that the up-timers wanted, expensive sugar and spices, rolled oats (a novelty that quickly became a favorite), fish, anything pickled, anything dried including various beans and several types of whole grains were all to be had in bulk. Prepackaged lots were uncommon, as were prepared foods, for the most part. Oddly, ice cream, which was mostly sold by the scoop, was attached to the bakery.

"Well, are you ready for the run on fish? We've bought everything we can get and it will be gone by ten," Benito said.

"Not to worry. We've got plenty. Actually, that new barrel of New England cod is really looking good. I hope the next one we open measures up. The pickled herring is pickled, the anchovies are salted and I'm not sure what that smoked fish from Finland is, but I want another barrel of it."

"Well, if you run out, you've always got beans."

"I don't know, Benito. We're down to only eight different kinds right now."

"Did you get me that peanut butter I asked for?"

"I keep putting in the order, but it never seems to come in."

"That's too bad," Benito said. Then he wandered over to chat with the produce man.

Fresh produce hardly changed at all. What was available was completely seasonal. Not to mention, produce that would have been

thrown out up-time was being sold and for a good price. There was nothing better to be had. By this time of the year, all he had were potatoes, apples, pears, onions and some winter squash. The last of the carrots were looking pretty sad. All of it came from the cold room at Ice and Slaughter.

Benito and the produce man walked the aisles just to see what was there. The shelves had a growing variety of products. Benito pointed to an oddity.

"Look at the price. I bet all three bottles go to the same buyer." Anything in an up-time package disappeared in short order at high prices. Out-of-towners would buy them either as souvenirs or for resale.

More and more new things were being sold off the shelf. Surplus from kitchen gardens could be frozen, dried or pickled and sold to the store or, just as likely, left for credit. Benito always grumped at the pickled vegetables when Elisa served them at home. They put his teeth on edge.

Delbert and Benito walked past all kinds of odds and ends on the shelves. Most of it was related to food. The store's buyer drew the line at clothes and such. There was a whole aisle of pots, pans, dishes and flatware. It used to be all used stuff. It now included new paper plates and napkins at an outrageous price which did not stop out-of-towners from buying them. A restaurant in town had them made up and the paper-maker sold what the eatery wouldn't buy to the grocery store.

Delbert said, "Mrs. Freeman's old ceramics hobby really took off." He was looking at her line of china.

"Are we still selling the tinker's wares to the other stores?"

A tinker was happy to sell them his wares, as long as they would take everything he made so he didn't have to hawk them at the market down at the fair grounds. The store's buyer had to sell some of it to other stores at first.

"Not since he started putting a Grantville trademark on his product. And even after they raised the price, we can't keep it on the shelves. The soap-maker ought to try that."

"Why not? It's working for the tinker and the broom-maker."

The "Made in Grantville" trademark sold almost as well as things from up-time, even if they didn't bring quite as much.

"I don't know how much longer we'll carry the pots and pans, though. I think the Wish Book is going to start cutting into our sales."

"Well, I guess the tinker can still make a living by making repairs. But I bet the catalog runs him out of business one of these days."

It crossed Benito's mind that Johnson's Grocery had a lot in common with the old general store he could barely remember from his childhood. It had a way of making him feel young and old at the same time. He knew he should be thankful to have a job he could handle at his age. But, when he thought of it, the quote from Eeyore the Donkey always seemed to come to mind: "The Good Lord gave us tails to keep off the flies. I'd just as soon have no tail and no flies."

Thanksgiving was past. Benito knew he had a lot to be thankful for. Still, the truth be told, he'd swap it all for a can of cranberry sauce and a bowl game on TV.

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Breakthroughs

Written by Jack Carroll



General Electronics laboratories March 1634

Something didn't fit, and it looked important.

Else Berding had gone to the break room for a cup of coffee. She came out to see Jennifer Hanson in the hallway, carrying on a conversation through a ham walkie-talkie. It was a little bit of a thing, no more than four inches high, with an eight-inch flex antenna sticking out the top.

"Far as I could tell from the phone message slip, it sounded like he was talking about some old CW transmitter that he hasn't used in years. Nothing high powered, but for sure a way to get on the air."

The other station came back. "That sounds pretty good, Jennifer. You think we could afford it for the club station?"

"Good chance of it. I'll be seeing him tonight, and we'll find out one way or the other."

"Okay, and if it don't work out, maybe we can build something up from junk box parts. Well, I've got a class in a few minutes, so I'll sign off with you now. W1PK, W8AAG."

"See you later. W8AAG, W1PK."

Else stopped dead. "A class? I've heard you talk to him before, but I thought he was someone here in the plant. Where is he?"

"Oh, that's Rolf Kreuzer. He's a junior at the high school. We've been scrounging around for some gear to put together a club station over there. The kids need it, if they're going to actually do anything with ham radio."

Else looked confused. "He's at the high school? What band were you using?"

"Two meters."

"I thought everybody said all those high frequency bands are line-of-sight, until the sky wave skip finally comes back."

"Well, it pretty much is."

"But, there's a hill between here and the high school! There isn't a line of sight between here and there."

"It's pretty close to one, though."

"Pretty close isn't the same thing at all. There has to be some other physical effect involved. *Does Professor Müller know about this?*"

Without waiting for an answer, Else charged off to her boss's office.

John Grover was just getting up to leave. Müller waved her in.

"Conrad, you asked us all to report any unexpected observations that have anything to do with the project . . ." Grover turned back, listening alertly.

Else described what she'd just seen. ". . . so you see, line-of-sight can't explain that. There must be another physical effect, to make that happen. It might be something we can use." Else stopped. She saw how Grover was standing. He was no longer poised like some prospector looking at gold dust on the bottom of a creek. Now he was leaning back against the door frame, and smiling slightly, like—a teacher listening to a favorite student? "You know about this." It was a statement, not a question.

"Uh, yeah, we do. There are several effects that can make a radio wave go around terrain obstructions. The army is making good use of them, too. Thing is, we don't think the Ostenders and the Austrians have figured it out yet, and we want to keep it that way as long as we can. So keep it quiet outside our group, okay?"

"Oh. All right. Well, I'd better go back to my desk, then."

By this time Jennifer had caught up, and they walked down the hall together. Else asked, "Did I do something foolish?"

"No, you did what they asked you to. I was about to tell you, but I didn't get my mouth open fast enough. I'm soooooorry. Forgive me?"

Else burst out laughing at the sight of a thirty-four-year-old wife and mother, pouting like a penitent little girl.

After they left, Grover stayed a moment longer. He shook his head. "Damn, that was brilliant."

Müller looked up at him. "Oh, yes. If we had two or three more like her, this project would move faster."

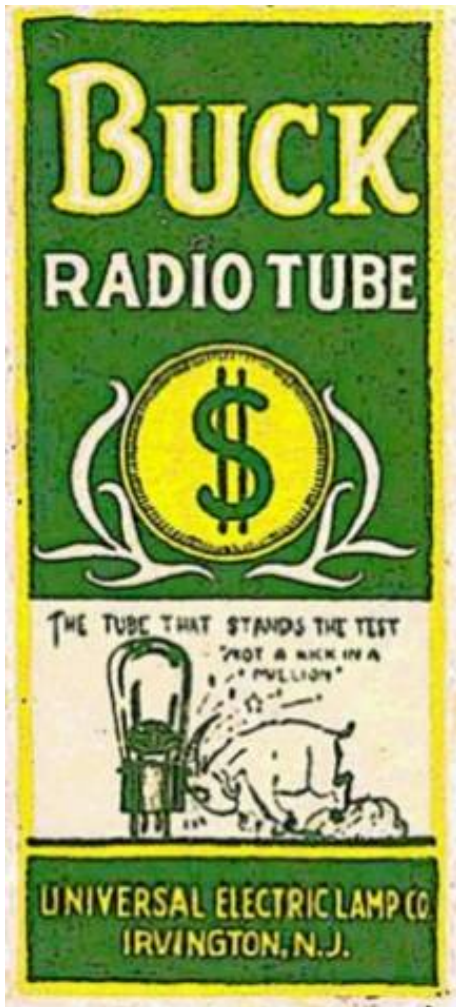
"You know why she spotted that so quick? Chuck Fielder and the rest of them teach their students to think like scientists."

* * *

The invitation to an interview at General Electronics had come as a complete surprise. John Grover had been honest, and so had Else.

"You understand, Mr. Grover, I've finished only about half the courses I planned. And even that is from study groups, not school courses."

"Yes, I do understand that, Fraulein Berding. But Conrad and I think the ones you've finished are the ones you need to do this job. Your last study group adviser thinks you have what it takes to learn the material.



"Of course, it would be better for you and us if you had the rest of the courses, and an experienced electronics engineer to work with on the job. But not much about the Ring of Fire was fair. There isn't anybody like that. What we have is a really good collection of

books on vacuum tube theory in Gayle Mason's library. What we don't have is somebody who can put them to work. You're the first person to come in here who has the math and physics to really understand the electrical insides of a tube."

"Wouldn't it work better if I went further with physics before taking up something like this?"

"Probably. But let me lay out the situation. VOA runs on tubes, and they don't last forever. We only have a few. When the last ones burn out, we're off the air unless we figure out how to repair them by then. Most of the long-range transmitters for military and diplomatic radio are in the same situation, and some of them don't have any spares at all. And then there's a lot of transistor gear the army is using. They don't need tubes, but when something breaks, we don't have parts to fix them with. Before too many of them wear out or break down, we need to be building replacements. And once we run out of up-time parts we can salvage, that takes tubes. We're already behind schedule. You can imagine what could happen if we let too much more time slip away. Battles can be won or lost in seconds. Better something they can use in time than a perfect solution too late."

"I see. I'm still not sure. Could I look at these books, and see how well I can understand them?"

"Sure. I can't let them out of the building, but I'll take you up to the library. And there's one other thing. You won't be stuck completely on your own. You know Charnock Fielder? He has a lot of other demands on his time, but he does some consulting for us. He can help you figure things out if something doesn't make sense."

"That might make a great difference. I had one of his physics classes. He explains things very well."

The next day Else was back.

"Mr. Grover, I've thought very hard about what you said. I probably wouldn't be alive if the Emergency Committee hadn't taken me in three years ago. They offered me citizenship and school. Now, it seems, it's time to pay back. I believe I can learn what is in those books. I will join you and do my best." She reached her hand across the desk to shake. She looked very serious and very young at that moment.

That night she prayed. *Lord, help me do what they ask of me.* Research engineer . . .

She lay down to sleep, wondering whether she'd ever hear anything of her family again.

* * *

Else had studied hard before, but not like this. But the principles were starting to make sense. The vacuum wasn't quite good enough yet, and it would be a while before the materials people could give her group what they'd need to build a test model, but they had some idea of what they'd be able to get within the next few months. Meanwhile, she was working out a couple of trial designs on paper.

Late in the morning Else went out to the lab. She called across the room to Heinz Bennemann, "I need to study the pieces of that dead tube you took apart some more. Where do you keep them?"

"Third shelf in the cabinet, in the little red felt-lined box."

"Felt-lined, is it? Still the fine jeweler?"

"I was only a jeweler's apprentice. Now they call me a general technician. It means I'll never be done learning things. There's no such thing as mastering this trade."

"No? What do you think a research engineer is?" Else took the box over to a bench where there was a microscope and a precision mechanical stage, and settled down on a tall wooden stool. A flapping belt drive under another bench caught her eye.

"Heinz, shouldn't there be a guard over that belt?"

"We'll put it on when we're done. You know Marius Fleischer, here? No? He's a mechanic from the vacuum group. He just brought over a better roughing pump, and we're trying it out."

Fleischer put in, "It seems to need a few adjustments yet."

He and Heinz turned back to the assembly drawing.

* * *

Marieke Kettering was a good-natured woman in her mid-forties, with the gift of maintaining her good nature regardless of what kind of deadline pressure and turmoil were erupting around her. Being in charge of personnel and purchasing for both VOA and GE, she needed it. She heard the front door close, and then footsteps coming to her office.

"Gertrud! What a pleasant surprise! What brings you here? Sit."

"Oh, Marieke, we were just passing by. We're going into town for a little shopping."

"And who is this fine fellow in your lap?"

"This is my little nephew Erwin Spiegelhoff. Erwin, say hello to Frau Kettering."

"Gwathm!" exclaimed Erwin, with the sunniest of smiles.

Gertrud continued, "So, have you seen the new Brillo play yet?"

"No, but I want to. My cousin says it's insane, with them saying one thing in English, and then not exactly the same thing in German."

"Well, why don't I see if I can get us some tickets? Do you think Hermann would want to come too?"

Erwin slipped off his aunt's lap and started playing with his wooden duck on the floor. After a few moments of conversation, Gertrud noticed the silence. "Erwin?" She looked around the office. No Erwin. She stepped out into the hall, just in time to see the toddler disappearing through a doorway.

"*Nein, Erwin! Komm zu Tante!*"

* * *

Erwin didn't feel like coming to Auntie just then. What he heard was the interesting rhythmic *blup-blup-blup* coming from under a bench. He saw the shiny things going round and round, and the long thin black thing bouncing energetically up and down between them. He made a beeline for the vacuum pump.

* * *

Else was just taking a quick stretch. Something was moving down low . . .

"Heinz! Look out!" She pointed at the little boy, and scrambled off the tall wooden stool, sending it flying.

Heinz dove for the floor, trying to get between the child and the moving parts. Else flew toward the spot. They got in each other's way for just a moment. Just as Heinz got an arm in front of the boy and started to push him back, and Else got one hand on the edge of the bench to brace herself and the other hand on the boy's shoulder, he grabbed the drive belt. It whipped his left hand under the idler wheel.

Marius yanked the power cord out of the wall and started cranking the roughing valve shut to keep the diffusion pump from coming up to air.

It was never clear afterward whether the child had grabbed at the test leads dangling over the edge of the bench, or whether Heinz snagged them with his foot as he hit the floor. Else saw something start to slide toward the edge of the bench, and tried to stick out a foot to cushion its fall. There was no time. It hit the floor with a sickening crack.

Marieke and another woman came running full-tilt into the lab just as the boy let out his first deafening scream. Else cradled the child in her arms, blood on them both.

"Erwin," the strange woman cried. "Erwin!"

Else called, "Frau Kettering! The first aid kit!" She held Erwin as still as she could, while Heinz took a fast look at the injury and got a bandage on it to control the bleeding.

Heinz looked up with a sober expression. "It doesn't look good. His hand is all cut up. He needs the hospital."

Marieke swallowed. "I'll get the ambulance." She picked up the telephone.

The other woman took Erwin in her lap and wrapped her arms around him. "Erwin, Erwin, it will be all right. There are good people coming to make it stop hurting."

Erwin screamed.

* * *

After the ambulance left, Else and Heinz finally had a chance to look at what had hit the floor. It was Gayle Mason's Simpson 260 multimeter. The case was smashed to fragments, the glass had a crack all the way across, and the needle was bent. Heinz delicately picked the pieces off the floor to prevent any more damage, and collected them in a box. About then, John Grover arrived in the lab to see Else glumly sizing up the remains. She showed him.

"It's a mess, all right. I'm a lot more concerned about that little kid, though. We've got other meters in the lab."



"Yes, John, but this is the only one with a calibration sticker from up-time. We've been using it to standardize all the other electrical measurements."

"Oh, boy. Well, we'd try to fix it anyway, but it looks like we have a real incentive here, huh? Heinz, you're about the best tech here for fine work. What do you think?"

Heinz shrugged. "I haven't worked on meters before. This is different from the other little parts I've made. I wouldn't like to take a chance with this, if there's anyone else in town who knows more about these things."

"Well, there's always AEW. They make meters. Fine, let's see what they think."

* * *

The accident investigation took up most of the afternoon. Jacob Cokeroff, the head of the vacuum group, doubled as the company's safety officer. He had barely started interviewing everybody involved when the city fire marshal showed up. Between the interruptions and the staff's state of mind, there wasn't a lot of useful work done for the rest of the day.

Late in the afternoon Cokeroff and the marshal were wrapping up in John Grover's office, and discussing what would go in the report. The phone rang.

"That was Marieke. She just heard from the hospital. Erwin is out of surgery. It's not great, but it could have been a lot worse. They had to pin two bones back together, and he's lost one joint off his middle finger. There'll be some scarring. Outside of that, they think he'll be able to use the hand all right."

Cokeroff nodded. "We should be thankful."

"Oh, yeah. I was really worried. All the effort we put into safety, and this comes out of the blue. We don't want anything like this to happen again. So, recommendations . . ."

* * *

The next morning, Frau Kettering started working through a handful of signed requisitions. Her first visitor of the day was a carpenter. "Right here, in the hall, between the offices and the workshops—I'll show you. A divided door, with fire exit hardware, locked on the outside. All right? How much, and how soon can you put it in?"

Next, she called in a sign painter.

"We need a sign on each of the doors going into the lab and shop area. 'Danger, Escort Required,' in big black letters on a yellow

background. German and English. Latin too, I think."

Then things got harder. She called the sales department at American Electric Works. "Hello, I understand you make meters. We have a damaged multimeter from up-time that needs repair. Can you help with that?"

"What exactly is that? Something we make?"

"No, it's from up-time. It's irreplaceable, and it was calibrated. We need it for a defense project. My engineers think you're the only company that would know anything about it."

The president of the company came on the line.

"This is Landon Reardon. What can I do for you?"

"This is Marieke Kettering at General Electronics. We have a damaged Simpson 260 multimeter. It was broken in a fall. I understand you make meters, and I wonder if your company could repair it."

"A 260? Yeah, I know what that is. I used one when I worked at the power plant. How bad is it?"

"Well, the case is in pieces, and some of the parts inside are bent. They're not sure what else might be wrong."

"Oh, brother." He sighed. "I can't promise anything, but send it over with the manual. I'll ask the guys to go over it, and we'll let you know whether there's anything we can do."

* * *

The man who sometimes called himself Johann Schmidt was intrigued. He'd passed this building before. *Those locks on the doors look new. Yes, the metal isn't weathered. Nobody to be allowed inside without being watched? Danger? What a naive ruse! There are secrets behind those doors. Obviously. Perhaps useful ones.*

He continued to observe the building at intervals, but now he came no closer than a block, and never faced it directly. His patience was rewarded after three days. Several people left work, and one of them didn't show the alertness and purposeful stride of someone in charge. This man was dressed a little more cheaply than some of the others. "Schmidt" followed, half a block behind and on the other side of the street. The man went into a drinking establishment, a nondescript working man's place. "Schmidt" went in after a few minutes. He found a seat across the room, ordered a beer, and sat down to sip it, speaking to nobody but the barman. He continued to observe, without looking directly. After a while, the plain-looking man joined a card game at a table. *This looks interesting. Yes, an indifferent player.* The play of expression on his face as he lost very small sums showed it. *Here's a man who can use a little money.*

The next night, "Schmidt" arrived first. The room was fairly crowded, but there were two neighboring unoccupied places at the bar. He took one of them and waited.

* * *

The pace at GE was back to normal. Normal meant frantic. Else was constantly dealing with things she'd never studied, reading up herself, sending queries to Father Nicholas and the other researchers, answering questions, supervising experiments, taking measurements herself, or conferring with specialists in other groups.

One time it would be Heinz asking, "Else, do these results make any sense to you?"

Cokeroff wondered, "There's a kind of high vacuum gauge that looks something like a tube. Do you know anything about that? Could we make it?"

Another time: "Else, do you think we'd be better off modeling the electric fields around the control grid by computer, or in an old-fashioned electrolytic tank?"

"I'm not sure, Conrad, I'll give that some thought and get back to you. Maybe they'd both have a place. Do you know a good computer programmer? But maybe an analytic solution might be possible."

At least she didn't have to worry about vacuum-tight electrical feedthroughs for the tube bases. That was mostly mechanical engineering, and Conrad Müller was working on it. Even so, it was hard to keep up with everything.

One morning she planned to write a technical paper on receiver tuning capacitors. She'd solved the math the day before, and now she was going to reduce it to a procedure an electronic designer could manage with only high school math. She reached for her notebook without looking, and felt—nothing. She looked up. There it was on her desk, but a foot to the left of where she was certain she'd left it the night before. Conrad came in while the befuddled look was still on her face.

"You look like something's the matter, Else."

"Nothing, really. I just misremembered where this was. I almost always put it over here. I was sure . . ."

"You do look tired. Are you getting enough sleep?"

"Well, I was up late last night studying. There's so much to understand, to be ready to move right away when we have a good vacuum."

"Ah. One thing I learned when I was a student was not to burn the candle at both ends. What am I saying? These days I study as much as I ever did. If you're too tired to think, you can't accomplish anything. Besides, there are dangerous things here. You don't want to

make some bad mistake."

"It's hard, sometimes, but there are so many people depending on us."

"You won't do them any good if you have to do work over because you were too tired to do it right the first time, or you get yourself hurt. Learn what your limits are and respect them. Workers must get enough rest to stay alert." He gave her a little smile, and left her to what she was doing.

* * *

The tube group found workarounds for the missing meter, but it was tedious and inefficient. Finally, the wizards at AEW pulled off a small, expensive miracle.

Heinz showed it off to the group. "See here? Somebody in the cabinet maker's shop at Kudzu Werke made this oak case to replace the broken one. And there's a padded leather outer cover. I might tie it to the bench the next time we use it, though. You can hardly tell that the needle was ever bent. They said there was a wire torn off a range resistor inside, and fixing that was the most delicate repair."

Conrad asked, "So it's good as new?"

"Well, not quite. There was some damage to the jeweled pivots they couldn't do anything about. We have to tap it lightly with a finger to get the needle to settle to the final position. But I've compared it with readings from some other meters before it fell, and it doesn't seem to have changed."

* * *

Heinz went back to putting together an experimental vacuum gauge he'd been working on the night before. He went to pick up his little Phillips screwdriver, but it wasn't in sight. *Maybe somebody borrowed it?* He looked at the nearby benches, but didn't see it there. Then he saw it from two benches away. It was behind his toolbox. *Hm. Must have rolled there somehow.*

* * *

Else kept tearing away at the theoretical work. It wasn't always tubes. It would have done GE little good to develop tubes if they weren't ready to make all the other parts for receivers and transmitters.

So it might be, "Else, Jennifer has taken apart an old coupling capacitor. It's made of tinfoil, paper, and beeswax. That, we could make, if we substitute copper foil for the tin. Could you work out the design equations, and help the manufacturing engineer figure out what kind of paper to use?"

On another day it was, "Else, Jennifer is asking for help. The *Radio Amateur's Handbook* has equations and charts for the inductance of an air-wound coil, but there's nothing about sizing it according to the power level. Can you come up with some recommendations? The techs can run any tests you need to confirm it."

Or Grover asking, "Else, we have a new high school graduate coming in tomorrow to apply for an electronic designer job. Would you help us interview him?"

Some nights they'd go up to the comm station to pick Gayle Mason's brains. John Grover was a fast hand at the key, but conversing in Morse code was slow going compared to talking face-to-face, especially on the nights they had to relay through Amsterdam. Still, Gayle saved them a lot of wasted effort.

While all that was going on, Else continued studying more advanced math. She could see that she was going to need the convenient but conceptually challenging theory of Laplace transforms even to understand the cookbook manuals, once she started in on the receiving filters that picked out just one incoming signal. So, she was currently participating in a group studying differential equations. It got together a couple of times a week. There was just so much to learn, and so little time before it would all be needed.

The family she boarded with had three small boys. She didn't exactly mind the noise, but sometimes it was too much even with her door closed, when she was trying to grasp really difficult material. Besides, her office was a comfortable place to study, and she could always get a cup of coffee from the break room. It was a much-appreciated benefit the company provided.

One night she was working through a textbook problem, with only her desk light turned on. The floor creaked briefly. *Somebody in the lab?* She looked out, but there was nobody there. Maybe it was the building settling after the heat of the day.

* * *

John Grover happened by while a couple of techs were joking about the haunted laboratory. "Oh, yeah, my dad used to tell stories like that. He worked on bombers in England during the Second World War. Stuff would go haywire for no obvious reason. They blamed it on the gremlins."



"What are gremlins?"

"Little people you never see. Kind of like fairies."

Jacob Cokeroff growled, "Gut, but we are in Germany, not England. If we are to have imaginary friends, they should be called kobolds."

"Sure, Jacob. On another subject, how's the vacuum looking?"

"Almost good enough to do something useful with. I have hopes of something usable for lab work in another week or two."

"Glad to hear it. The materials folks have been poking into some pretty strange places and come up with little bits of scrap to try out. Thanks to Father Nick for the clues again."

The experimental work was about to start.

* * *

Else decided she needed a change from her difficult math studies. She decided to attempt something not quite so demanding for the moment. She could see that with the stage the project had reached, she'd need to operate transmitters herself before very long. So she decided to get her license now, rather than later. After two evenings with the study guides, she felt ready. And so, one Saturday morning, she showed up for the test session put on by the Grantville Amateur Radio Club's volunteer examiners. Typically for Else, she passed on the first try. They issued her a ham license and a station call sign—W8AAQ. Then they invited her to the club meetings.

* * *

On the last Friday afternoon before Labor Day, there was a set of cathode coating samples Else wanted to test herself. Near the end of the day she finished taking the data, and shut everything down but the vacuum pump. The tech who'd stayed as safety observer while she had the high voltage on went to finish up some other work. Else wanted to think about the results over the long weekend, so she took her notebook along in her canvas bag, along with some reference material.

After she left the building, she happened to glance back. *What on earth? I'm sure I turned off the bench light.* She mentally cringed. *If I hadn't looked back, three days of that bulb's life would have been used up for no reason.*

Else stepped into the lab, and stopped. What she saw made absolutely no sense. Somebody was sitting in front of her bench, writing on a piece of paper. She could see by the warning lights that the power was on. *Why is somebody else repeating my experiment? It's that mechanic from the vacuum group—why would they be interested in this? Why would Conrad let somebody else run my setup,*

and not tell me? And there's nobody else here, this is an awful safety violation.

She spoke hesitantly, just loud enough to be heard over the noise from the vacuum pump. "Marius? What are you doing?" The color drained out of Marius Fleischer's face, and he came up off the stool with a squawk, unbalancing it and knocking it over. He tried to dodge around Else to get out the door, but one foot caught in the stool's rungs, and it pulled him to one side. Else saw him coming straight at her. She took a half-step back to get a firmer stance, and reached out to fend him off. The shove unbalanced him further. He shot out his hand to one side for support. It came down on the power supply. "Conrad! Heinz! Anybody! Help!" Else shouted.

* * *

When Conrad Müller and two techs came running into the lab half a minute later, they found Else on her knees, one hand on top of the other, pumping rhythmically on the center of Fleischer's chest.

Müller called, "Heinz! Call for an ambulance! Electric shock." He knelt beside Else and said, "I'll take over the CPR. Turn off anything dangerous before the ambulance gets here."

Between emergency treatment and getting the lab into a safe condition, things were busy and confused for the next few minutes. After the ambulance crew got through with the defibrillator and it looked like the patient would probably live, Conrad finally had time to ask, "What happened?"

Else shook her head. "He was re-running the experiment I just finished. Did you tell him he could do that?"

"No, of course not. There was nobody else here? He didn't want anybody else to know. Now, why? He wasn't taking that data for our benefit . . ."

Heinz put in, "Kobolds."

"What?"

"All those times things weren't where they were supposed to be. Maybe some of the time it was us being absent-minded. Maybe some of the time it was him looking at stuff, and not remembering just where it was before he picked it up."

Conrad called John Grover. Grover called army intelligence. Two agents had a long discussion with Marius Fleischer.

* * *

"Fleischer talked, no problem," the intelligence officer said. "He didn't even try to clam up. Unfortunately, he doesn't know anything useful. He has no idea who he was working for. It was dead drops in both directions, money and instructions in, reports out. The only time he met anybody face-to-face was when he was recruited, and he didn't get a name—which would have been fake anyway. The guy spoke perfect high German, like some local burgher. Maybe he *was* a local burgher, or had been."

Grover sat back in his chair. "Wow. Tradecraft like that? Sounds like some Russian faction."

"Not necessarily. Could just as easily be somebody who read a bunch of spy novels. Maybe a foreign spy, maybe just a free-lancer selling secrets to anybody who'll pay."

"You catch anybody else?"

"No. By the time we got to talk to him, he was overdue to shift the position of a half-brick underneath a mailbox someplace. Whoever was servicing his drop quit doing it. So. What did Fleischer get?"

"Well, the general scope of what we're working on. Building all the radio gear we can with the parts we can find, developing tubes and new components, and all our vacuum work right up to the minute. Writing up the vacuum work was part of his job—he didn't even have to hide that. We've been asking everybody about their kobold experiences, and it looks like he was poking into just about everything around here that gives clues to what we're doing and how we're doing it—if we're not all being paranoid now. If he got some of Jen's antenna designs, a good analyst might be able to figure out what we're really doing with radio, but that cat got out of the bag, anyway. One big thing he didn't get is a workable formulation for a good cathode coating and a process to make it, because we don't have that yet ourselves. And we don't have any complete tube designs. But it looks like we're getting close, and he probably reported that."

"Kind of careless, wasn't he? Weird, sitting down and running that lab test. I don't see why he took the chance."

"Probably because Else took her notebook home that night, so he couldn't just copy the data. He must have thought there was something important in those results. There wasn't. Well, I doubt anybody else can put together the industrial base to use what he got for a long time."

The officer's face grew grim. "Don't be too sure. Those machine tool factories have been running three shifts for a couple years now, and not everything they've shipped has turned up where it was supposed to go. There's an industrial buildup starting somewhere. Still, you stopped him before he got the real goods."

* * *

The only thing to do was keep the work going as fast as they could sustain it.

They had to order parts to repair some of the equipment Fleischer had dragged to the floor when he fell. At least this time, it was all

down-time equipment they'd built themselves. It took four days to get everything working again.

Meanwhile, the materials group delivered a new batch of samples. Else hooked up the test gear. "Let's see what they've given us today. Maybe we'll be lucky." She turned up the voltage while Conrad and Heinz watched over her shoulder. Ten minutes later, the numbers in her notebook told the story. "There's emission, Conrad, but not enough to be useful for a tube. We aren't there yet."

"Well, you know what they say. Any experiment that produces data is successful."

"I keep telling myself that," she said with a rueful smile. "I'd better go show them these results."

Heinz interjected, "This is much better than last time, though. It feels like we're close."

* * *

It took two more batches of samples, and three more weeks. This time one of the samples was twenty times better than the rest. Still nothing like the best up-time cathode coatings, but marginally usable. Else said the magic words: "Conrad, I think it's good enough. Just barely, but good enough. With this, I can design an amplifier tube."

Müller straightened up and smiled. "How long, do you think?"

"Probably a day or two. I'll do the calculations, and give Heinz the drawings for the parts. Then we'll see."

Things happened fast after that. Near the end of the week, Else and Heinz were mounting the delicate assembly in the vacuum chamber and starting the pump-down. The next morning it was baked out and ready. Else finished connecting the test setup. She turned to Heinz with a nervous smile. "You'd better check it too. We've come so far, I don't want to risk burning something out now." He started comparing the connections on the bench against the diagram in the notebook, lead by lead. Finally, Heinz said, "I agree, Else. It's correct."

Else looked at the bench with a little frown. There was so much test equipment spread across it, that there was no room for her notebook. She settled herself on a lab stool, with the notebook in her lap. "Heinz, you'll have to work the knobs this time. To start with, load resistance to maximum. Grid voltage . . ."

He began stepping the voltage and load controls through the test conditions as she called them out, while she took down the meter readings. By the time they were halfway through, it was obvious. Müller was already on the phone to John Grover. In some mysterious way, word started to spread through the building, and heads began popping out of offices and shops. Finally, the test run was complete. Müller took one long look at the columns of numbers. Then he stepped out into the corridor grinning like a seven-year-old on his birthday, and held out both hands above his head thumbs-up. Cheers erupted.

When he came back into the lab, there was a serene look on Else's face that he'd never seen before. She was gazing out the window at the brilliant reds and golds of the sugar maple outside. One arm was draped casually along the edge of the bench, and the other rested on the notebook in her lap, the pen still in her hand. She looked up at him, and spoke quietly. "Now we know, Conrad. We can do this."

Heinz was still shutting down the power supplies. Without looking up, he said, "Now we got to figure out how to turn this into something we can put in a glass shell and seal it up. We still got work to do."

* * *

The push was on for the payoff. The former jewelers and glassblowers were working the kinks out of their new techniques, getting ready to cut open the precious burned-out up-time tubes. The test samples from the materials group kept getting better. Else was continually revising her repair part designs and performance estimates.

The engineering contingent was starting to look ahead to pilot production tooling for the new tube designs. Conrad and Else walked down to Marcantonio's machine shop one afternoon, to have a brainstorming session with the machine designers there.

"Well, what do you think, Else? Is the job a little less intimidating now?"

"Oh, I still have days when I wonder whether I know what I'm doing. But, yes, this is the most fascinating thing I can imagine. I've decided. This is my career. There's a lot of studying left before I can finish the curriculum, but I intend to be an electronics engineer for real. What about you, Conrad? It still feels strange to be calling a full professor 'Conrad.' Are you going back to teaching?"

"When the right time comes, I will. Yes."



"So. We'll all miss you, when you do."

"Maybe not. I might be teaching right here. There's starting to be a little loose talk of a college, for engineers, like us. Maybe we'll get you teaching, too. I hear you've been doing some lecturing."

She blushed. "What? Those little talks at the radio club? They're nothing. Nothing at all."

* * *

Toward the end of the year the power lines reached Schwarza Castle. Five months later the Schwarza Castle two-meter repeater went on the air. It was the most ramshackle collection of obsolete junk imaginable. Higher hills a few miles away limited its useful coverage. But it worked. Rolf Kreuzer spearheaded the effort, and the automatic Morse code identifier carried his call sign. And Rolf made his own career plans and signed up for calculus in the spring term. But that's another story.

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A Falcon Falls

Written by Kerryn Offord



Saturday Morning, December 31, 1633, Grantville

"*Swan Lake!* How does she expect us to do *Swan Lake*? And in Magdeburg. The woman is raving."

Harvey Matowski glanced back up the road. Nearly half a mile away, just outside the high school, he could see the headlights of a bus as it started its next run carrying patrons home from the ballet. He was surprised that it had taken this long for his wife to explode. "Yes, dear."

"There aren't even any suitable buildings. You realize she expects us to put on a performance on an open air stage."

"Yes, dear."

"The whole thing is impossible. And did you hear Her Ladyship? I should move my ballet school to Magdeburg. It's all right for her, but my people have to stay near their jobs. If I move the school to Magdeburg, I'll lose half my senior dancers, and as for the youngsters . . . they have to stay with their parents. If I move the school to Magdeburg I'll lose Cathy McNally." Bitty wailed.

"I'm sure Mrs. Simpson doesn't mean you should move the school immediately, Bitty. Just start thinking about moving. I'm sure some of the dancers are going to want to move to Magdeburg anyway. For a start, there's Carl. I know he's still at the party networking for work for Kelly Construction in Magdeburg."

"Bloody Carl. Bloody Army. If it wasn't for the Army I'd still have Joel to lead and I wouldn't need Carl."

"Yes, dear."

"I'm cold, Harvey." Bitty sniveled, rubbing her hands over her bare arms and shoulders.

Harvey draped the coat he had been carrying over her shoulders. The cocktail dress Bitty was wearing might have been comfortable in the cafeteria where the first night "Meet the Cast" dinner and cocktail party was being held. However, it had never been designed to keep a woman warm outside in the early hours of a mid-winter morning. He was surprised that it had taken his wife this long to cool down enough that she could register the ambient temperature. Mary Simpson must have really upset her.

"My feet hurt."

It was a plaintive cry, but totally understandable. Not only had Bitty been on her feet since the early hours of the previous day, but high heels were not suitable for stalking in high dudgeon half a mile down a road.

Next morning

Bitty looked at the sorry remains of what had been a favorite pair of high-heeled shoes. They were badly cut up from last night's extended walk on the road. Maybe Uncle Mark or his partner Hans Bauer could repair them. It was no use crying to Harvey. He'd only point to the small mountain of shoes littering her wardrobe and ask what was wrong with the other few dozen pairs. Men just didn't understand a woman's relationship with her shoes.

The exertions of the last thirty-six hours were coming firmly home to roost. Her feet still hurt, but she was used to that. Years of en pointe dancing had almost immunized her to foot pain. It was the total lack of energy that was so distressing. While she dressed Bitty wondered where Harvey was. When she opened the bedroom door, the smell informed her that he was busy in the kitchen. Hurrying as best she could, she followed the tantalizing smells to their source.

* * *

After inhaling the last of the pile of blueberry pancakes and syrup, Bitty finally noticed the empty kitchen. "Where is everybody?"

"They were up and had breakfast earlier. I insisted they leave you to wake up naturally."

"Did they have pancakes, too?"

"No, love. I made them especially for you. After last night you needed a pick-me-up, so I made your favorites."

"Thanks. I really needed them. But it's a pity the girls and Joseph are gone. I wanted to talk to them about Mrs. Simpson's commitment for us to do *Swan Lake* to celebrate Independence Day."

Harvey shook his head. "I'd wait until the end of the *Nutcracker* season. They have enough to worry about just getting through this weekend. No need to give them new worries just yet. There'll be plenty of time next week."

Saturday, January 7, 1634

Bitty stood back and watched while Amber Higham passed out the paychecks for the previous weekend's short season of *Nutcracker*. There was an air of noisy celebration among the younger dancers as they compared checks. For most of the boys and girls it was more money than they ever had at one time before.

Glenna Sue Haggerty called out. "Miz B, when's the next season of ballet, and which one are we doing?"



The room went silent. Everybody waited on Bitty's response. She wasn't really ready for this, but she couldn't keep putting it off. "Mrs. Simpson is arranging a season of performances of the arts in Magdeburg around the fourth of July. She has asked that I put on a short season of ballet."

"Where in Magdeburg, Mom?" Bitty's elder daughter Staci turned to Carl Schockley. "Carl. You've been there. Is there anywhere suitable for a performance?"

Carl shook his head. "Not that I'm aware of. There are a few guildhalls and the like. They might be suitable for taking class or putting on small musical recitals, but until the opera house is built, there isn't going to be anywhere to perform for an audience."

"Carl's right," Bitty interrupted. "However, Mrs. Simpson wants an open air performance in Hans Richter Square."

Staci looked shocked. "Where did she get a dumb idea like that, Mom?"

"Kirov's Gala performance in Red Square was on television before Christmas. She seemed to take the view that if the Russians could put on a performance of ballet on an open air stage, then we should be able to."

"Oh. So, Mrs. Simpson wants us to put on a collection of scenes from selected ballets?"

"If only. No. She wants *Swan Lake*."

"What! But Mom. That's impossible. There's no way we can find enough dancers."

Bitty smiled wryly. "You and I know that. However, I don't think Mrs. Simpson is really aware of the problem. Which leaves us with a second problem. She's already told her society friends that we'll be doing it. If we let her down, well, we can kiss Mary Simpson . . . and her patronage, goodbye."

There seemed to be some brightening of faces at the prospect of Mary Simpson dropping her involvement with the company. Bitty acted quickly to correct their misconceptions. "And *no*, that would not be a good thing. Mrs. Simpson made a valid case for a move to Magdeburg. And she's right. We'll never make the company pay here in Grantville, and when we move, I'd much rather have her on my side than against me."

"Move the company? Is Mrs. Simpson going to provide enough money to support the company? I mean, most of us have jobs. We can't just move to Magdeburg because she wants you to move the company."

"Magdeburg's out for me," Babette Goss said. "If I go anywhere it'll be to Erfurt to be with my husband."

Lynette Fortney held up her hand. "If you're short of people, I might be able to get a transfer to the law courts in Magdeburg,"

Bitty looked at her remaining senior dancers. Glenna Sue Haggerty and Natasha Fortney were supposed to start teacher training after they graduated from high school. Richelle Kubiak was also graduating this year, but she already had a job lined up with her foster mother and would probably be staying close to Grantville. Marcie Haggerty had a year to go in her teacher training. Bitty's younger daughter Melanie had only been training as an electrician for a year and wasn't sufficiently qualified to find work in Magdeburg yet. That left her daughter-in-law Alice, her elder daughter Staci, and Casey Stevenson. "Alice, do you think you could get a transfer to Magdeburg?"

"I don't know, Mom. I don't think the Air Force has anything going in Magdeburg."

Carl Schockley spoke up. "If the Air Force won't hire you, Alice, Kelly Construction will. We need trained drafts people. Heck, if you're interested I can probably sign you on now and start you on your way to Magdeburg on the next train. Believe me; we need people with your training."

Bitty sighed. "I guess that means you'll be spending a lot of time in Magdeburg this year, Carl?"

"Yes, it's my turn to be based in Magdeburg."

Bitty turned her attention to Staci and Casey Stevenson.

"I'd like to help you Bitty, but what can a physical education teacher do in Magdeburg?" Casey looked over at Staci. "Staci's a bit better off having done the ESOL course, but what can a couple of teachers do in Magdeburg?"

"Teach."

All eyes turned to the source of the comment. "What do you mean, Elisabeth Sofie?" Casey asked.

Stepping forward, a little embarrassed at suddenly being the center of attention, Elisabeth Sofie tried to explain. "Fraulein Casey, you are a teacher. An up-time teacher. What you should do is start a school in Magdeburg. A secondary school for girls. Something that will take girls from schools like St. Veronica's Preparatory Academy and prepare them for the new women's college, or just to teach the advanced skills that the wife of a successful merchant or land owner needs. My Tante Dorothea Sophie has a secondary school at Quedlinburg. If you wish, I can ask her if she thinks it is possible."

"Thank you, Elisabeth Sofie. If your Tante Dorothea Sophie thinks a secondary school for girls in Magdeburg is a good idea, Staci and I will look into it."

* * *

Bitty, who had stepped back from the discussion, stared at Elisabeth Sofie, names tumbling through her mind. Somewhere she had heard the name Dorothea Sophie before. With a shake of her head she turned her attention back to her students. "Back to our original problem. What are we going to do about Mrs. Simpson and her open air performance of *Swan Lake*?"

"Offer some alternative." Joseph Matowski called put.

"What do you mean, Joseph?" Bitty asked her younger son a little tersely.

"Its obvious to everyone we can't do *Swan Lake*, and you said you didn't want to get on the wrong side of Mrs. Simpson. The only way to stay on her good side is to offer an alternative when you tell her we can't do *Swan Lake*."

"And does the font of all wisdom have any idea what we could put on?" Staci asked sarcastically.

Joseph smiled. "Yes."

"Well? Speak, little brother. What is this great idea you have?"

"The life and death of Hans Richter." With barely a pause for his audience to absorb what he had said, Joseph started speaking again. "Just think of it. A ballet in three acts telling the story of Hans Richter, from lowly mercenary to hero of Wismar."

Some of the girls laughed, but Bitty nodded. "That might actually work." The idea had merit. However, creating a totally new ballet presented a few problems. The only advantage was that here and now, they could create their own rules as to what a ballet should contain. "Casey, Alice, you both studied some choreography at college didn't you?"

"Yes, Miz B. We both did some papers. Are you really thinking about Joseph's suggestion?" Casey answered.

"It's the best idea I've heard since Mrs. Simpson dropped her little bombshell. If you and Alice could come to my place, we can start working on it."



Ever since Elisabeth Sofie mentioned her Tante Dorothea Sophie, Bitty had been worrying the thought that the name was familiar. Seeing Elisabeth Sofie being collected by her cousin Countess Emelie had jogged her memory. Laughing, she looked at her startled companions. "I've just remembered where I heard the name Dorothea Sophie."

"Well, Mom, don't hold us in suspense. What's so special about Elisabeth Sofie's Tante Dorothea Sophie?"

"I think you've all forgotten who Elisabeth Sofie is. Do you remember the ladies that turned up at rehearsals with Mrs. Simpson?" At their nods Bitty continued. "One of them was an Abbess Dorothea Sophie of Saxe-Altenburg. She rules the Damenstift of Quedlinburg."

"Oh! When Elisabeth Sofie talked about her Tante Dorothea Sophie having a secondary school, she really meant *her* secondary school. Not one that just happens to be close to where she lives, but one she runs," Staci said.

Tuesday January 10, 1634. Grantville

"Fräulein Casey, Fräulein Anastasia, I have talked to Tante Dorothea Sophie and Papa. They think the idea has merit. Also, Papa suggests that such a school would benefit from having a suitable patron." Elisabeth Sofie ducked her head for a moment before looking back at Staci and Casey, then in a rush, she said, "Papa suggested that the school could be called 'The Duchess Elisabeth Sofie Secondary School for Girls.'"

Staci and Casey looked at each other, then at Elisabeth Sofie. "Why would you want to be patron of a school?"

"Papa thinks it would not hurt for me to develop a public profile as a person of influence. And under the circumstances, starting with a school would be ideal."

"Why do you need a profile as a person of influence? And why would a school be ideal?"

"It is to protect my inheritance. Papa has no faith that his heir will respect his will."

January 1634, Grantville

Bitty led Lady Beth Haygood to the four watching young women. "Lady Beth, I'd like to introduce you to the Grantville Ballet Company's brain trust. There are my daughters Staci and Melanie, Joel's wife Alice, and Casey Stevenson. They helped me put together the proposal for the ballet on the life and death of Hans Richter."

"Did Mrs. Simpson go for Joseph's idea then, Mom?" Alice asked.

"Yes, love. She had already been getting reports of problems from Marcus Wendell, so she was ready to compromise. Mary loved the idea and is happy for us to work on it. She's even authorized a budget to get the music prepared, just as soon as we can work out what music we want. I'll be checking with Marcus to see what is and isn't possible over the next couple of days."

"So the useless little runt has finally managed to justify his existence," muttered Staci.

"He's never going to let anyone forget it either," Melanie agreed.

"Staci! Melanie! That's no way to talk about your brother. We'd really be up the creek without a paddle if he hadn't come forward with his idea."

"Yes, Mom. Sorry, Mom."

"Did you ask Mrs. Simpson about helping with the school, Miz B?" Casey asked.

Bitty shook her head apologetically. "I'm sorry, Casey. I totally forgot. I'll try and talk to her tomorrow."

"School?" Lady Beth asked, looking with interest at Casey.

Casey nodded. "We were talking about moving the company to Magdeburg and how one of the problems would be how could we earn a living. Melanie is training to be an electrician, which will be a trade very much in demand. Alice already has a firm offer to work for Kelly Construction as a draftsman, but all Staci and I are qualified to do is teach. One of the down-time dancers suggested we should think about opening a school for girls in Magdeburg and offered to talk to her family, and the Duchess Elisabeth Sofie Secondary School for Girls was born."

"What sort of help are you hoping to get from Mrs. Simpson?"

"We aren't really sure yet, Mrs. Haygood. But she has all sorts of connections. We desperately need someone to help. Staci and I don't have any idea what's involved and we're not sure we can impress the parents. They'll look at us, see a couple of young women, and either try and talk down the fees, or take their daughters elsewhere."

"What you are looking for is a school principal then? A mature person with administration experience?" At Staci and Casey's nods, Lady Beth continued. "What sort of salary package are you offering?"

Staci and Casey exchanged blank looks. "That's one of our problems. We don't know how much we should pay. We don't even know what a teacher should be paid, how much we should be charging, or how many teachers we really need. We don't even know what questions to ask."

Lady Beth smiled. "So you need someone to do the work of getting your school up and running from scratch, and then to keep it going?"

"And who works cheap." Casey smiled as she said it. "We know getting the perfect person is a pipe dream, so we might as well ask for the impossible."

"Actually, girls, I think I know just the person you need. An up-timer with just the right qualifications comes to mind. She won't be cheap exactly, but well worth the price if the numbers add up."

"Who, Mrs. Haygood?"

"Please call me Lady Beth. I might be interested."

"You?" Bitty asked.

"Yes. It would be a perfect solution for me. I want to be with Jere in Magdeburg, but there's nowhere suitable to send Bethie Ann. I've just about resigned myself to waiting until she's old enough to leave school. However, if your school can take her, then I can go to Magdeburg to be with Jere. Of course, it would be even better if I had a job in Magdeburg to look forward to. Can you tell me a bit more about your school? Who is Duchess Elisabeth Sofie? And how much money is she putting up?"

"Elisabeth Sofie is one of our down-time dancers. Her father, Duke Johann Philipp of Saxe-Altenburg, is offering us title and the rents for a village with about fifteen hundred acres just outside the walls of Magdeburg. He's also offered to arrange a long-term lease on some land inside the walls for the school. And said we can use some of the rooms in his new town house while the school is being built."

"So you have a noble patron, a lease on some land, and you own a village and farm land that will help support the school? Sign me up."

Late January, 1634 Grantville

"Well, I'm sorry, but if you want any of the Sibelius, then you're going to have to stick to canned music for a while," Marcus Wendell said. "Even the piano score will take a while to transcribe, and if you want any of the music rearranged, that'll take more time."

"I guess that means we have to do what we did with *Brillo*."

"What did you do for the *Brillo* performance?" Marcus asked.

"We made a tape."

"Ah!" Enlightened, Marcus looked from Bitty to the Sibelius CD and the boom box. "So you don't really need a live orchestra for the ballet?"

"I was promised a live orchestra, Marcus."

"Yes, yes I know," Marcus answered. "But, if worse came to worse, you don't absolutely need a live orchestra, right?"

"Marcus, have you any idea how hard it is to perform to a tape? Do you realize just how difficult it is to restart without a signal from the conductor?"

Marcus didn't know much about ballet, but he had dealt with enough stage shows as a teacher to know that the conductor needed to keep an eye on the stage to keep the music in time with the action. "Bitty, I understand what you're getting at, but there're problems in Magdeburg. Have you thought about the acoustics of the square?"

"I wouldn't have thought it had any." Bitty answered without giving the question much thought. "Aren't you going to use amplifiers and stuff? I'm sure Mrs. Simpson said something about borrowing the Navy's PA system."

"We were. I mean, we are. We were planning on borrowing one of the church control boards to run everything, but none of them can cope with the number of different input devices we'd have to use. And it's going to be pushing it to get enough good quality microphones for everyone."

"Are you saying you can't deliver live music for the ballet?" Bitty asked.

Marcus's posture collapsed with a heavy, heart felt sigh of utter frustration. "No. I'm not saying we can't deliver. Just that you should look at developing a backup plan. We're having a little trouble with the down-time performers. They've had a few problems adapting to the new instruments, and some of them are having difficulty with the new music." He gave Bitty a wry grin. "They find it too dissonant."

"If you need any help making the tape I can probably loan you a couple of my people, and with a finished tape, transcribing to get a complete score should be much easier."

Late February, 1634, Grantville

"Staci, Casey, Alice, how are you all? I've just this minute arrived back from Magdeburg. That bit of land inside the walls the duke's agent has found is ideal. It's just off a main road where they plan to install a tramway sometime in the future. That'll increase the radius from which you

can draw pupils. And being just down the road from the Duke of Saxe-Altenburg's townhouse means the location can't be better."

Staci waited until Lady Beth paused for breath. "So you're still interested in running the school then, Lady Beth?"

"What? Oh yes, definitely, and some of the up-timers in Magdeburg are also interested in your school. I spoke with Rowan Washaw and she was very enthusiastic." Catching the blank looks, Lady Beth elaborated. "Rowan is getting the St. Veronica's Academy in Magdeburg up and running. That'll be a useful feeder. And I've found a possible extra up-time teacher. Ceci Jones. She did English at college and is certified to teach. Currently she's running a single room school for the children of up-timers, but she likes the idea of having the support of other teachers."

"I know Ceci. We did the ESOL training together." Staci said.

Lady Beth nodded absently, "Good, now, Abbess Dorothea Sophie has given me a list of local families she's been forced to turn away from her school in Quedlinburg. I've spoken to some of them, and as long as the abbess approves the curriculum and graduates are qualified to enter one of the proposed new colleges, they're interested. A couple of the families commented that a local school with up-time teachers would be much better than having their daughters go to Quedlinburg as boarders." Lady Beth gave the girls an apologetic smile. "I think they mean 'a lot cheaper.' Anyway, I know you were planning on starting with just a fifth and maybe a sixth grade, and introducing new grades as the pupils advanced, but a number of the potential fifth and sixth graders have older sisters. It would save the parents a lot of trouble if you could accommodate the older sisters as well."

"I guess that will be okay," Staci said. "But what sort of numbers do you think we'll have, and can we earn a living?"

"To pay the rent on the school, a living wage for you and Casey, me, Ceci Jones, and a handful of down-timer teachers and other staff, and provide everyone with room and board, I estimate we will need something like one hundred and eighty pupils to break even. The abbess thinks that your first year you should easily get thirty fifth graders and maybe twenty sixth graders, with another twenty or so pupils spread over the higher grades. Based on the parents I spoke to, those numbers seem possible. You should expect to reach break even point and be adding more staff inside five years."

"So what do we live on for the next five years?" Staci asked.

"The rents from the village," Lady Beth replied. "They won't be high, but if you can encourage the tenants to adopt some of the up-time farming techniques they should grow fairly quickly, especially the way Magdeburg is growing. Of course, if you had some capital to invest, the farm yields could increase much faster."

"If we had investment capital for what?" Casey asked.

"Farm productivity on the property is low because of the damage years of rampaging armies have inflicted. The tenants are farming with the bare minimum of tools and draft animals. If you can raise some money to supply modern farm implements and draft animals, not only will you improve the estate's chances of attracting tenants, but the rents you'll be able to charge will be higher."

March 1634, Grantville

Bitty joined the rest of the company watching the pair on the practice floor rehearse their moment of glory in *A Falcon Falls*. She held her breath as they approached the finale of the routine. It was supposed to end with a particularly spectacular hands free fish dive, and this was the first complete dance through at normal speed.

"Joe's looking good, isn't he, Mom?"



Staci's words echoed Bitty's thoughts. "Yes. It'll be nice having a reliable lead male again."

"Hey, Carl's reliable."

"When he's around," Bitty muttered, giving Staci a meaningful look.

June 1634, Hans Richter Square, Magdeburg

Lady Beth led Bitty through the crowd of spectators to the enormous stage that dominated the southern edge of what was an extremely large public square.

Bitty gestured to the people who were spread over the bleachers and sitting on blankets on the ground. "Who are all the people?"

"Just normal people. They started coming out during their lunch break to watch the stage being built. When rehearsals started, there was a surge in interest."

"Why are you letting them watch?" she demanded, her waving arms reinforcing her dismay at what she is seeing. "Rehearsals should be away from the public gaze. That way the magic isn't lost."

"Bitty, there just isn't anywhere big enough to rehearse in Magdeburg. At least, not with a suitable floor." Lady Beth paused while Bitty filled in the blanks.

"Stone floors?" At Lady Beth's nod she shuddered.

"Or undressed timber," Lady Beth added

Bitty nodded. "Okay, so the floors had no life or they would shred slippers, but why haven't you closed off the stage?"

"It's only for half an hour during lunch hour that rehearsals are public Bitty. And never in costume." Still Bitty didn't look convinced. "Carl and the girls think its good PR to let the people see what the new ballet is about."

Bitty could see Carl and the girls arranging the performers for the next piece. "Explain!"

"It started quite innocently, Bitty. As soon as they finished laying the floor, Carl and the girls tried it out. They didn't bother to hide what they were doing and a bit of a crowd stopped to watch. You know Carl. Give him an audience and he puts on a show."

Bitty nodded. That explained why they'd started, but it didn't explain why they were still giving even a short free performance. She'd have words with Carl and the girls later. Meanwhile she turned her attention back to the stage. They were rehearsing the last sequence from the first act. The battle scene, where the hero first meets his love interest. Several lines of men, the mercenaries, moved in slow time. Opposite them, a single line of soldiers, the Americans, tapped time in place. Suddenly a dancer, Bitty was able to recognize Mike Song, shot diagonally across the stage from the American side. He stamped his heels rapid fire as he spun, to finish with a full splits leap, a grand jeté, over the falling mercenaries. Mike was good in his role as the machine gun tracer.

Mike's entry was the signal for the Americans to start clogging in earnest. This was supposed to represent rifle fire, and more mercenaries fell.

One more pass by Mike and the Americans charged the mercenaries, breaking their line and routing them.

Then it was time for the ministering angels. While other dancers checked out the fallen soldiers, four of the dancers, Elisabeth Sofie, Catherine Matzinger, Ursula Sprug, and Richelle Kubiak, joined hands and started a sequence stolen directly from the second act of *Swan Lake*. It had been included more as a sop to Mary Simpson and her friends than for any real choreographic reason. While they danced, Casey ministered to the fallen hero. The scene ended with Carl being carried off in a litter, Casey at his side.

There was a moment of silence as the music died. Bitty was among the last to rise to her feet. Once standing she turned her amazed gaze over the crowd. They had rushed forward, in a remarkably organized way, and were now crowding around the dancers on the ground in front of the stage. Bitty pointed to the melee. "What . . .?"

"Groupies. It was a bit of a shock the first time it happened."

Evening, July 4, 1634, Hans Richter Square

Bitty was nervous. The performance of *Brillo* earlier in the day had been a rousing success. However, this was different. For a start, the crowd was mostly high-priced glitterati and they were here to be seen, rather than to see the ballet. The crowd for *Brillo* had been aficionados, or people out to be entertained. They had been the kind of crowd that performers love. One that they could feed back on, one that helped them reach new heights. And reach new heights they had. Having more than three thousand vocal fans cheering and applauding everything you did had that effect.

Tonight would be different. The glitterati liked to pretend that nothing impressed them. Not even the electric flood lighting that allowed them to find their seats easily as dusk fell. Tonight was unlikely to be a rousing success because the wealthy just didn't respond that way. Success from tonight would be measured by how willing the audience was to be associated with the new ballet. It would be measured in pledges to Mary Simpson's new arts center. And that was another thing. Where was Mary Simpson? She should have been here. Her absence was being noticed, and not in a good way. People were calling her absence a snub of the highest order. If the Lady Admiral didn't consider the premiere performance sufficiently important to attend in person, maybe the ballet was not sociably important. If that perception was allowed to settle, then Bitty's hopes of bringing ballet to the seventeenth century could die in its infancy. Mary had to make an appearance soon, and with a really good excuse for why she missed the premiere.

* * *

The sun had sunk below the horizon and the flood lights had been turned off. Inside the fenced off area for paying customers the audience were chatting to each other. In just a few moments Bitty's company would present its first offering to the wealthy of Magdeburg.

Lady Beth settled as comfortably as she could. Jere sank deeply into his seat, casting an eye around the crowd as if to check that nobody he knew could see him. When sweet reason had failed to persuade her husband to accompany her to the ballet, Lady Beth had been forced to bring out the heavy artillery. Jere had finally agreed to come, but did so with muttered references to horses and water.

She had seen the final dress rehearsal, but having seen the boost the live audience had given the dancers in *Bad, Bad Brillo* earlier in the day, Lady Beth had high expectations of this evening. However, Bitty had warned Lady Beth not to expect too much. Her experience from up-time being that audiences could be divided into two groups, those that attend to see and be entertained, and those that attend to be seen. The audience for *Bad, Bad Brillo* had been there to see the ballet. Tonight's audience was mostly here to be seen.

The first chords of Mussorgsky's "Promenade from Pictures at an Exhibition" caused the audience to settle. With the last notes of the Promenade, the curtain raised on the first scene. It was a military camp, with Tilly's soldiers and camp followers the night before the big battle. The one that the up-timers called the battle of the Crapper, but which was more correctly called the Battle of Badenburg. The audience was treated to a series of dances performed to Borodin's "In the Steppes of Central Asia" by mostly down-timer dancers. There was a lot of jumping, leaping and thumping of boots in the male-dominated dances. In the background soldiers were drinking, fighting, and getting up close and personal with some of the females. A group of soldiers from Carl's group picked up one of the girls and carried her struggling form off stage. Carl turned to watch, then returned to drinking until he collapsed.

At the end of the scene there was polite applause, nothing like the same scene had garnered in rehearsal, even without costuming. With grudging acceptance that this was going to be a hard audience to please, Lady Beth continued watching. Maybe when the girls went en pointe after the battle scene things would improve.

The second scene was well underway before there was the first hint of interest from the audience. It occurred when Mike Song streaked across the stage in his red costume, the harsh light of the spotlight making him seem to glow. He actually drew a reaction close to awe when he finished each pass by leaping over the falling soldiers. The running jump with full splits, something Bitty insisted on calling a grand jeté, seemed to defy gravity, so long did he seem to stay in the air. Maybe there was hope for this crowd yet.

Finally Casey and the ministering angels entered. There was an attentive silence from the audience while they danced. Whether it was the costuming, or the fact that they were females performing in public, Lady Beth couldn't be sure. She had heard that the strong black Casey was wearing was more difficult to obtain than the whiter-than-white the angels wore. However, both were surely going to be talking points.

* * *

Casey at his side, Carl was finally carried from the stage. The lights faded out and the curtain fell. Then the music stopped. There was some very cultured applause when the dancers lined up to take their bows, then, the curtain falling for the last time, the floodlights in the square flickered on, signaling the end of the first act. Lady Beth nudged her husband. "Well, Jere? What did you think of that?"

"Not bad. How long is the intermission? Do we have long enough to catch a drink and something to eat?"

Lady Beth sighed with exasperation. "Jere. You're here for the ballet, not to feed your face."

"It was okay, nothing stood out, but then, you were saying that it gets better as it continues." He led Lady Beth to one of the concession stands. "Maybe it'll grow on me."

"Jere." Lady Beth gave her husband a disappointed look. "We'll grab something to eat and drink, then circulate. I want to be able to tell Bitty how the audience reacted. And you—" She looked pointedly him, "If you can't say something good, keep your mouth shut. Understand?" "Sure thing, Beth."

* * *

Jere was already seated and Mussorgsky's Promenade was playing when Lady Beth returned from having a quick word with Bitty. So far most comments from the audience had concentrated on the costumes and the colors, with a few comments on Mike Song's performance as the machine gun tracer. Lady Beth hadn't heard any negative comments on the music, which was fortunate for Marcus Wendell. It was bad enough that Marcus had been unable to provide the promised live orchestra, but given how he had vetoed a lot of Bitty's suggestions and requests on the grounds that the audience wouldn't like them, Lady Beth didn't like to imagine how Bitty would react if the audience panned the ballet because of the music.

The second act started with a combination of bits from every joyful scene Bitty and her brain trust could remember, set to the overture and a few bits of the pastorale of "Offenbach's Orpheus in the Underworld." From Don Quixote there was the flirting Basilo making up to all the girls until Kitri marks him as her own. Of course, that had to be Carl and Casey. There were solos by Melanie as a street dancer, and Staci and Alice combining as Casey's two friends. The guys weren't left out. They had sequences culled from various ballets. It was a long scene with mass dancing mixed around the solos. Bitty and her team had chosen to go for the dramatic when they choreographed the scene, cutting out all the "boring" bits, as Joseph called them, and inserting lots of leaps, lifts, and pirouettes.

"What do you think now?" Lady Beth asked Jere in a whisper.

"That high prancing step the girls do is cute. And I like the costumes, especially the way the skirts float when they spin."

"Jere! You're supposed to be watching the dancing, not staring at the girls."

"But that's the most interesting part," Jere protested.

"Shush. The flying scene is next."

The flying scene started with Joe as Jesse Wood and Carl in flying uniform. First Joe would demonstrate a move, and then Carl would follow it. When the intermezzo from Sibelius' Karelia suite started in earnest, Carl literally took to the air. Where the audience had been drawn to acknowledge Mike Song's grand jeté in the previous battle scene, they were spellbound by Carl's solo. Then Joe joined him. Together they really cut loose. The glory and freedom of flight could be seen in the way they danced. The brain trust had been forced to rewrite the sequence several times when Carl and Joe continually surpassed expectations. The speed of the pirouettes and the astonishing amount of élévation and airtime the two dancers achieved was remarkable.

Lady Beth nudged Jere. "Happy now?"

"How do they stay up so long?" an astonished Jere asked?

"Bitty said it's just an illusion caused by shifting the center of mass."

"That's some illusion."

"Carl claimed it could have been better."

"How could anything be better than that?" Jere asked, gesturing towards the stage with his head.

"Carl suggested that dance could be enhanced if they performed en pointe, but Joe nixed that. I don't think he cares for dancing on his toes."

Lady Beth glanced around the audience. They were quick glances, she really didn't want to miss anything. Seeing the videotaped version of this just wouldn't be the same. The audience, the impossible-to-impress glitterati, was spellbound. Well, not all of them, but enough of them were sitting up and taking notice.

Carl and Casey launched directly into the grand pas de deux when the flying scene finished. Lady Beth had thought that Carl wouldn't be able to maintain the pace, but the first moves of the pas de deux to Smetana's Vltava were a crowd scene, and gave him a little time to catch his breath. And he needed to.

"How does he do that?" Jere whispered. Carl was lifting Casey above his head with one hand again. "He's not that big, and Casey isn't particularly small."

"It's all in the technique, Jere. Just watch and appreciate it."

The curtain fell with Carl and Casey embracing. This time the audience exploded into applause. The curtain was raised and the dancers advanced to the front of the stage to acknowledge the applause, until finally, someone decided enough was enough. The curtain fell and the floodlights came on signaling intermission.

* * *

Lady Beth decided that seeing Bitty to report on crowd feedback on the second act would be redundant. Instead, she continued circulating, making contact with the important guests, asking them how they were enjoying the performance. Most of them, even some of the males, were enthusiastic.

The third act was the final battle scene. The battle of Wismar, where Hans dies. Mussorgsky's Promenade again warned the audience that the curtain would soon rise, and the few stragglers hurried to their seats. The curtain raised to ships of the invasion force moving across the stage. When the enemy warships left the stage it was the turn of the three American motor boats with their rocket batteries to dance around the stage

searching for the enemy. This action was repeated a couple of times before the stage was cleared a final time. There was a quick change of scene to the airfield. Carl and Joe were getting ready to leave. Casey kissed Carl goodbye, and then she joined the small crowd to see them take to the air and fly off.

Once in the air, Carl and Joe searched for the enemy and flew toward them. When Carl and Joe left the stage the enemy fleet crossed the stage again, to be followed by the motor boats. Then the special effects guys really earned their money. The first shots fired were rockets that shot across the stage on wires. The audience didn't know how to react. There were explosions off stage and gun smoke drifted on stage from the wings. More rockets were fired, to be met by a volley of cannon fire. Again only the muzzle blast of the cannons appeared on stage. Then a "boat" containing Joseph speed across the stage, tossing Joseph overboard before speeding off stage, to be followed moments later by another explosion. There were a few shocked reactions as clever use of fabric and lighting made it appear that Joseph was shy half a leg. Lady Beth smiled, that was that for the Navy, payment in full for the use of their generator, lights and sound system.

The curtain fell, to rise a few moments later. There were ships stationary in the water. Special effects had some of them "burning." Joe continued to circle at a distance while Carl attacked a Danish "ship." With a graceful grand jeté that took the audience by surprise, such was the élévation he achieved and how long he seemed to float in the air, Carl cleared the ship, only to stumble as he landed on the other side. Lady Beth stifled a gasp. That wasn't how it had gone in rehearsal. She had to admire Carl's quick wits when he took advantage of the stumble to imply he had been hit by gunfire. The wounded Carl then circled the warship. The strong twisting turning jetés that Bitty called "Coupè Jetè en Tourants" that Carl executed put the lie to his deadly injury. But Lady Beth had to agree with Bitty and her fellow choreographers, if opera could get away with the dying heroine singing on forever while dying of consumption, Carl could continue to astonish the audience with his élévation and speed while taking his time to die. But die he must. With one last look towards Joe, and by some amazing coincidence, the audience, Carl launched himself at the enemy ship. This time he timed his grand jeté so that he landed within the "ship." Coming down in full splits, he hit the concealed pad with a loud thud. Immediately the special effects crew let off the fireworks. Under the cover of the cloud of smoke the ship was wheeled from the stage, leaving Joe to dance a solo for the fallen hero.

Then started the penultimate scene. It was a complex arrangement. Casey danced to Sibelius' The Swan of Tuonela from his Lemminkäinen Suite. Lady Beth shuddered as the pure mourning and lament of the English horn solo penetrated. On the stage she could see Joe "landing" and telling Sharon that Hans was lost. There was interplay of horn and cello as Joe and the ministering angels tried to comfort Casey in her grief. The scene lasted all of nine minutes, finishing with Casey dancing to the English horn solo in an almost wistful restatement of the solo theme, answered by the softly surging strings, and the return of the cello solo. The music alone was enough to send a shiver down Lady Beth's spine. Wiping a tear from her eye, she doubted there could be a dry eye in the audience.

Carl returned as the dead hero after a quick costume change. To the strains of a hacked arrangement of the hymn from Sibelius' Finlandia, his spirit danced. The finale was a pas de deux without the partners touching, danced to a rearrangement of Mussorgsky's "The Great Gate of Kiev." The majesty of the music perfectly complemented the grandeur of the dancing. Several times Carl and Casey passed close. But never close enough to touch. While Casey danced as the mourning heroine, the ministering angels danced around her, combining with four young men dressed as pilots. With the new falcons and their partners always between them Casey danced with Carl as her shadow, replicating every step. With the penultimate restatement of the fanfare, the new falcons took to the sky and Casey collapsed, the angels gathering around her, leaving Carl still dancing in the background.

The stage darkened. Only a single narrow spotlight on the mourning Casey lit the stage. Carl was the only person left moving on the stage. The audience could follow him as he circled the stage in a slow coupè jetè en tourants by the ghostly glow of the specially treated white pilot's costume he was wearing. Then the ultra violet lamps that were causing his costume to fluoresce were slowly turned down, causing Carl to gradually fade out. Finally the only light was that on Casey. It stayed on for several beats, before it too faded, leaving the stage pitch black.

There was a moment of silence when the curtain fell. Lady Beth was excited with the way the performance had gone, but that moment of silence seemed to last forever. Then the applause followed. It was something between the unabashed enthusiasm of the morning's audience for *Brillo* and the polite indifference Bitty had feared. A reasonable compromise, Lady Beth felt, especially for the first performance of a new ballet.

* * *

In the cruel light of the morning Bitty made her way to Hans Richter Square in company with her husband. The first night party had continued well into the early hours of the morning, and with Mary Simpson still not making an appearance, Bitty had been forced to stay until the end. The party had been a success, except when people continued to ask after Mrs. Simpson. But at least Bitty had had an answer to the second most asked question. Lady Ulrike, the princess's governess, had briefed her during intermission at the first showing of *Bad, Bad Brillo*. The princess had "asked" that *Bad, Bad Brillo* be performed. The quiet emphasis Lady Ulrike had put on the word clearly indicated that the request had not been open to negotiation. As a result Bitty was placing responsibility for the performances of *Brillo* exactly where it belonged, firmly on the slender shoulders of Princess Kristina. In response to the astonishment of the questioners that the princess had ignored the situation in Franconia when asking for the performances, Bitty pointed out that, yes the princess was a princess and as such there were certain expectations. However, when all was said and done, she was still just an eight-year-old girl. One couldn't always expect a young girl, even one as precocious as the princess, to understand the political repercussions.

The smell of cooking food was the first indication that they were close to Hans Richter Square. Bitty had to smile when she cast her gaze over the milling crowds. Surely the king and his courtiers hadn't envisaged this use for their square. There were colorful tents and pavilions spread from one end of the square to the other.

Bitty noticed that Harvey was gently guiding her to one side. She almost asked why, but then she saw what Harvey, with his superior height, had seen. In a sunny corner behind the stalls a group of boys and young men were trying to replicate some of the moves from the ballet. There

were some stamping their feet, just like the clogging line, others were attempting to leap and pirouette. Further away a group of girls were trying to pirouette on their toes. Most of the girls had fans just like those used by the dancers. After a moment to take in what they were seeing, Harvey pulled Bitty away. "They would have been embarrassed if they knew you'd seen them, Bitty."

"But they were trying, Harvey. They were interested enough to try. I've never seen that kind of reaction before, not even after we did *Nutcracker* over Christmas." What she had seen perked Bitty up. She no longer felt the effects of the late night and insufficient sleep. She started to bounce a little.

A Week Later, Duchess Elisabeth Sofie Secondary School for Girls, Magdeburg

All was well with Bitty's world. Today would mark the official opening of the first stage of the purpose-built facilities of the Duchess Elisabeth Sofie Secondary School for Girls. The Magdeburg Arts Week had been a success, helped in no small part by the breaking news that Mrs. Simpson and Veronica Dreeson had been kidnapped and delivered as prisoners to Duke Maximilian. What he would want with a couple of elderly women, Bitty had no idea. However, everybody who mattered seemed to consider the kidnapping sufficient excuse for Mrs. Simpson to miss her Arts festival, and it garnered a lot of sympathy to her cause. The company had played to full houses for five performances of *Bad, Bad Brillo* and three well attended performances of *A Falcon Falls*. Bitty had been fielding inquiries about the Ballet Company and the proposed Magdeburg ballet school ever since the story broke. Pledges and more tangible forms of support for Mary's proposed center for the performing arts were pouring in. Lady Beth had reported that it was possible that there were sufficient funds to not only secure the desired land, but also, to actually pay for the proposed opera house. All that was needed was for someone to approve a design.

There had been some further news. Bitty wasn't sure if it could be called good news. That would depend on how the funding for the stage had actually been arranged. However, the city of Magdeburg was making arrangements to purchase the stage for use in other events, and already there was talk about next year's Fourth of July season.

From her vantage point at the back of the school hall, Bitty could see over the sea of interested family, students, potential students, and their parents. On the stage she could see Casey, Staci and Ceci sitting quietly with Lady Beth, the down-time teachers, the new music director, Marla Linder, and the important dignitaries present for this most important occasion. Bitty tried to stop herself fidgeting while she listened to the gentle drone of the mayor and other less important people. Finally, Duchess Elisabeth Sofie, her father, and then her aunt, Abbess Dorothea Sophie of Saxe-Altenburg took their turns. Everyone appeared to listen. Not, Bitty was sure, that the parents were overly interested in what Elisabeth Sofie had to say, but they were polite people. They listened to Duke Johann Philipp, her father, because he was after all, a duke. What Dorothea Sophie had to say though, was listened to intently. They had seen the literature the school had been handing out. The presence of the abbess suggested support for the claims made in the literature. Actually hearing the abbess confirm her support for the school, hearing it straight from the horse's mouth, so to speak, would have a considerable influence on the listening parents. Her confirmation that the curriculum for this new school had her approval, and that graduates from the school would be eligible to attend her new woman's college in Quedlinburg could be all many of the parents needed to hear before deciding to send their daughters to the school.

Eventually the speeches were over and Elisabeth Sofie officially declared the school open. First the personages filed out, then the parents and children followed. Finally Bitty and her husband joined the teachers as they left the hall. "What now?" Bitty asked.

"We go into sales mode, Mom," Staci replied. "We show people around the new school and try to get them to sign on the dotted line."

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The Whippoorwill

Written by John Zeek



"I'm getting too old for this shit." Anse Hatfield swung off his horse, the dull pains in his back and legs reminding him that camping rough and riding all day was a young man's game. He waved to Sergeant Albrecht. "Hold off making camp. Now that we've finally caught up with the Army, I'll go see where they want us."

Following General Torstensson's army on the march from Hamburg had seemed like an interesting assignment. Then he discovered that when the Swede moved an army, it really moved. They were better than twenty miles ahead of the TacRail company sent to support them. Not surprising when TacRail laid track at two miles a day and Torstensson moved his army a good twenty miles in the same period. The roads behind the army had been a mad house. Companies of troops and batteries of artillery were all moving forward, all trying to get into position. Finally they stopped just out side a little town called Ahrensböök Anse's surveyors hadn't kept up really; only the fact that they were all mounted and the army had stopped allowed them to make contact.

Anse had to ask directions twice, but he found the command post. He spotted Cameron Hinshaw setting up his radio on the back side of a small knoll. "Hey, Cameron. How's it going, and where do I report in? My people need a place to sleep tonight where no one will roll a cannon over their tents."

Hinshaw looked up and grinned. "Bit of a cluster fuck, ain't it? We been running the legs off of the infantry, and they're still coming in. Where you camp is up to Colonel Jackson and I guess he's who you should report to. I doubt you'll get much sleep though. Even if no one rolls a cannon over you."

"Whoa, Bubba. Last time I looked Frank Jackson was a general. When did this happen?"

Hinshaw glanced around. "You know Torstensson is in charge?"

"Yeah. So what?"

"Well, Torstensson wanted Jackson on his staff, but as a colonel. So General Jackson is now Colonel Jackson in the USE army, but he's still a general for Thuringia-Franconia."

Anse smiled. He always thought Frank Jackson was getting too big for his britches with that general business. He was going to enjoy this. Frank Jackson was standing with a group of officers at the top of the knoll. Anse nodded goodbye to Hinshaw and walked over.

He gave his best parade ground salute. "Chief Warrant Officer Hatfield reporting in with a party of eleven, Colonel. We are surveying the route for your TacRail support, Colonel. If it pleases the Colonel, we will camp with the army tonight and head back to deliver our survey." Anse was proud of working colonel into his report three times.

Before Jackson could answer one of the other officers turned. Anse recognized General Torstensson and snapped to attention.

"TacRail? You don't have one of your trains with you, do you? That would be too much to hope for."

"No, sir. We're just surveying the route. The railhead is about twenty-two miles back. It'll be at least a week before they can get a line here, maybe ten days. However, the telegraph line should be here tomorrow or the day after and we have a line clear back to Hamburg."

"Oh, well. We fight with what we have. And we fight tomorrow morning." Torstensson turned away.

Anse didn't realize he was just standing and gawking until Colonel Jackson caught his attention by saying, "You picked a hell of a time to show up, Hatfield. We've got a battle to fight."

"Where do you want my men?"

Jackson was getting a harassed look on his face. "Get your men over with the organ guns, put them under Len Straley and come back here."

The organ guns were bound to be in the thick of any battle. And Anse knew Len. Anse didn't think he'd want eleven strangers added to his command just before a fight. Before Anse could make a fool of himself by protesting one of the other officers turned and smiled. It was Nils Ivarsson, who had been on that darn trip to Suhl with him. "Colonel Jackson, if I may I would like to have Herr Hatfield's party as part of my force. Since my troops are skirmishers, his people would be a positive addition. While with the organ guns they might have problems of coordinating." Nils pointed. "We are out on the left flank."

Colonel Jackson stood and pondered. "Very well, Captain. Mr. Hatfield and his party will be attached to your troops for the next few days. And, Hatfield, don't screw up. I want to see you after the battle."

Ivarsson waved to Anse and they walked back toward the radio. "Congratulations on your promotion, Captain," Anse said. "I was surprised to see you."

"General Kagg thought I needed some time with the troops to further my military career. Besides, where better to be than directly under Torstensson's eye when I do my deeds of glory?"

Anse looked up and saw Nils was grinning. Anse didn't like that grin. Nils was sometimes devious, very devious. "What do you need me to do?"

"Do? I want you and your men in my line. I was short a lieutenant, now I have you. I'll bring your people up to a half-company with some of my extra men. Don't worry, I have a good sergeant for you, and I'll put you right beside me in the line. I've seen you in action and I know you can do this."

Anse thought those organ guns were starting to look good. "Well, I have to warn you my people include a couple of untried kids. So don't expect too much. It's just a surveying party with a couple of linemen to string telegraph wire. That better be a damn good sergeant."

"Not a problem. I have some of the best trained men in the army. I recruited a number of Jaegers while we were in Suhl and we all have the new rifles. More importantly, Linkersdorf is a very good sergeant and a Jaeger himself."

* * *

Sergeant Albrecht had the men resting under some trees, and the horses were placidly chomping the grain in their nose bags. Anse had the thought, once again, that it was great to be working with professionals. Udo Albrecht was only twenty-five, but he had been a soldier for years before joining TacRail. "Sergeant, this is Captain Ivarsson, and we're joining up with his people. The French have been caught."

Sergeant Albrecht looked at Anse, then looked closer at Nils and turned to his men, "Load up men, we are going with the captain."

* * *

The Swedish/USE line extended for a little more than a mile to Anse's right. To his left was a half company of Nils' skirmishers and then nothing. If the French tried an end run around them, they would have to slow them down and fall back. But it didn't look like the French were planning on much. Anse could almost make out some of the men's faces, they were that close. Not surprisingly, the men he could see through his binoculars looked a lot like his own. Young men who had no idea what was going on and no real understanding of the issues involved.

PFC Hagen Filss slid in beside Anse holding a bowl of porridge. "Chief, Sergeant Albrecht said you missed breakfast so I brought you some porridge." Hagen handed Anse the bowl, then twisted around to peer at the enemy.

"Keep your head down, Hagen," Anse said. He put down his binoculars and took a mouthful of porridge. "The French ain't going to sneak up on us. Did you get any thing to eat before you brought me this?"

"I wasn't hungry Chief. My stomach is too jumpy to eat."

Hagen had never been in action before. Anse gave him a stern look. "Go back and eat, force it down if you have to. It's going to be a long day and our next meal might be a long way off. And keep your head *down*." Hagen looked doubtful, but duck-walked back toward the cook fire. Anse took another small bite. It was pretty good porridge, for field rations, even had some crisp bacon pieces. But he found that, like Hagen, he wasn't really hungry. He set it aside and went back to watching the French.

Linkersdorf, the Jaeger sergeant, slid behind the log. "See anything interesting, sir?"

"No, Sergeant Linkersdorf. And I've told you before; I'm not really an officer. Call me Chief or Herr or, shoot, even Anse, will you?"

"Sure, Chief." Linkersdorf pointed to Anse's unfinished meal. "Stomach a bit touchy, Chief? If you don't want that I'll finish it. Waiting for a battle makes me hungry."

The Jaeger was testing him. "No, Sergeant," Anse responded, picking up the bowl. "I was just letting cool a bit before I finished it. It's too good to waste." He forced himself to start eating again.

Linkersdorf pointed to Anse's binoculars. "May I?"

When Anse nodded the sergeant took the binoculars and looked over the log. Anse used the time to study his men's position once more. It was damn strong in his opinion. They had deepened a natural ditch and piled logs in front of it to give more protection. Anse looked further down the line. Ivarsson had set up his command post in the center of his company.

Linkersdorf started cursing in German too rapidly for Anse to follow. Anse slid his rifle over the log and looked through the scope. A fancy dressed man on horseback was riding up and down in front of the French lines. That had to be an officer preparing the troops for an assault. *What a waste of horse flesh.* Anse could see the ribbons braided into the horse's mane and tail. Ribbons that matched the officers coat. The

horse was actually prancing, almost dancing across the front of the French troops. *What an asshole.* The officer had now drawn his sword and was using it to point and wave at the USE lines.

Anse tapped the sergeant's arm. "Run and tell the captain what you saw, and ask what he wants us to do."

Linkersdorf backed away from the log and Hagen slid back into his place next to Anse. "Is this it, Chief? Are they going to attack?"

"It sure looks like it, Hagen. Get ready." Hagen rolled over and started digging in his pack. Anse was not surprised when he pulled out two hand grenades, but the M-1 folding stock carbine was a total surprise. "Where did that come from?"

"It is Sergeant Toeffel's."

"I know it's Toeffel's. What are you doing with it?"

"Toeffel gave it to me. He and Sergeant Rau told me to look after you."

Anse snorted at the idea of having a seventeen-year-old bodyguard. "Stay close and keep your head down. And remember that's just an overgrown pistol. Use your rifle until they get close."

Hagen looked a bit doubtful, "But it will shoot as fast as I pull the trigger? Won't it?"

Before Anse could answer all hell broke loose. It sounded like Friday afternoon in a boilermakers shop when the right flank advanced.

Linkersdorf dropped beside Hagen. "The captain says we are going to stay in place. If the French advance we are to hold them until the right wing breaks their army. He says to start harassing fire to slow them down."

Anse called out, "Everyone in line. TacRail men, check your priming and hold your fire until they get within a hundred yards. Jaegers, fire when you have targets. Sting'em, boys. Make them hurt." The railroaders and Jaegers were mixed together in two and three man groups, so that each Tacrail man had the support of at least one experienced Jaeger. Anse was glad to see that they all knew enough to stay low behind the logs that formed their line.

Anse returned to looking through his scope. The same officer was still out in front of the troops across from him. The horse had stopped its dance and the officer on its back was just staring at the battle forming up on the French left.



It wasn't sporting, it might even violate the rules of war they had here and now, but it might help keep his men alive and even some of the French troops alive. Anse let the cross hairs settle on the officer's throat. The rifle jumped in Anse's hands and the bullet sped down range. Anse watched the officer slump in the saddle.

Everyone seemed to take Anse's shot as the signal to open fire. Not just Anse's men, but Lieutenant Gressler's men to the left and the rest of Nils' company to the right.

Anse brought the rifle down to scan the French line. He worked the bolt, watching another French officer wave to the troops. Anse aimed and squeezed the trigger. The man fell out of the saddle.

Hagen started to rise up and Anse kicked his leg, "Keep your head down."

Anse saw a smile on Linkersdorf's face as he reloaded. "You must be a rich man, Chief." The sergeant shook his head.

"What?"

"You just threw away twenty thousand guilders in ransom if you capture an enemy officer." Linkersdorf brought his SRG up and rested it on the log, "The proper way to slow down an assault is to shoot the sergeants." He fired and a man holding what looked like a half pike at the end of the French line tumbled into the dirt.

Things were starting to happen quickly now. The French were still advancing, taking casualties, but never wavering from their steady approach.

Anse was reloading for the third time when he felt something hit him and found himself sitting on the ground with no idea how he got there. Hagen was looking at him with a wide-eyed stare. Only then did Anse feel the pain in his left hand.

"Hold still, Chief," Hagen said. "Let me bandage your hand."

Anse had to know, he pulled his hand out of Hagen's grasp. The bullet had neatly clipped off the entire ring and little finger and taken the first two digits of his middle finger. And now it hurt like hell. Anse let Hagen finish his bandaging.

He pulled himself back to the log and looked around. The bullet had smashed through the stock of his rifle, right at the magazine. The rifle was a write-off. He drew his pistol and peeked over the log. The French infantry in front of them were still advancing. There was a terrible beauty to it, but the fire from Ivarsson's skirmishers was tearing their formations to pieces. Then officers and non-coms were waving their men forward. The whole mass started to charge across the field toward Anse's position.

Anse checked his men. Most were firing; a couple looked like they had been wounded by splinters and a couple of the Jaegers were down. "Pour it on boys, pour it on and they'll break."

But the French didn't break. It looked like they would not be stopped, but they had to be stopped.

"Everyone load and hold fire," Nils shouted. "We'll give them a full volley when they reach fifty feet. Those who have them, check your bayonets."

Anse gave the same order, shouting to his men in case they hadn't heard it. They prepared for one final desperate attempt to break the French advance.

The French musketeers halted at close range and took aim. Anse realized only the logs and ditch could save his men. "Down everyone," he cried as he ducked behind the log.

The impacts of the bullets nearly destroyed the low log wall. Anse peered through the gunsmoke. The French pikemen were charging, the musketeers close behind.

Anse had just started to aim his pistol when he saw Hagen pick up the carbine and jack a round into the chamber like he had been using auto-loading weapons his whole life. That reminded him, the grenades. He bent over to reach for the closest hand grenade and a hammer blow drove him to the ground.

Through a red haze, Anse saw Hagen standing over him, the carbine pointed toward the French. Hagen was finding out if the carbine did fire every time he pulled the trigger. Anse's world faded to black.

* * *

"He was a good man. I liked him."

"Good man is not enough; he was the best man in a fight I ever saw."

The voices filtered through Anse's ears as he regained consciousness. *Who are they talking about? Surely not me, I ain't dead.* Anse tried to move and a burst of pain flashed through him. *Well, that settles that. I'm alive. Being dead couldn't hurt this much. But why can't I see. Am I blind?*



Anse tried to speak; all that came out was a croak. But that was enough. "Hey, the chief is awake." Light flooded Anse's vision when the cloth that covered his eyes was pulled away. But why was his vision so blurred?

Bottger touched his right shoulder. "Don't try to move, Chief. You got a nasty wound, but you'll live." Bottger brought a canteen to Anse's mouth. "Take a drink."

Anse swallowed a mouthful of water. It was foul and tasted of the metal in the canteen. It was the best tasting water ever. He took another swallow, tried to raise his right hand and was rewarded by pain, but the arm moved. He pushed the canteen away. "How long have I been out?"

Bottger looked doubtful, like he didn't want to answer.

"Tell him, Private. He needs to know," another voice said. The stranger was a tall thin man. A Swede or someone with the Swedish army. At least, Anse thought, he wasn't a prisoner.

"You've been unconscious for the better part of two days, Chief," Bottger stammered. "You had us worried. We were afraid we were going to lose you a couple of times."

Anse asked the first thing that came to his mind. "Did we win?"

"We sure did. The French cavalry ran off and the infantry surrendered. We have been picking up their wounded for two days. It was a murdering great battle. The battlefield is a mess."

"That might be a little more than he needs to know right now," the stranger said.

Bottger went on. "Chief, you were hit in the left shoulder and it looks like you took a bunch of splinters in the face. The surgeon had to cut out

the bullet. All told, you've lost a chunk of muscle about the size of a turnip."

Anse started to relax a bit. It sounded like he wasn't likely to lose the arm. At least both wounds were on the same side, left hand and arm.

"And my face?"

Bottger looked at the stranger. Anse could tell that the private didn't want to answer. "Go and tend the other wounded, Private. I will tell him."

The stranger squatted next to Anse. "I am Dietrich Weiss, a surgeon with General Torstensson's army."

Anse was starting to worry again. It had to be bad if an experienced man like Bottger was afraid to tell him.

Weiss looked Anse straight in the eye. "I have always found it is better to have a man's friend tell him about his wounds if possible, but your private likes you too much and is afraid of hurting you."

"Get on with it Doc. You're starting to scare me."

"You have lost a great quantity of blood, but you will live. Keep that foremost in your mind. You will live to a ripe old age . . . if you avoid battles in the future. As the private so elegantly put it, you have lost a large bit of muscle tissue from your left arm and shoulder. I doubt you will never regain the full use of that arm, but I may be wrong. Your will have some use of your left hand as I was able to save the thumb and first finger and a piece of the middle finger."

"My face, Doc. You're not telling me about my face."

Weiss squeezed Anse's shoulder. "You took a large number of splinters in your face, as the private said. One of which penetrated your left eye. I am afraid you will never regain vision in that eye."

"So my left arm is crippled and I'm blind in one eye? Is that everything?" Anse tried to act calm, but inside he was screaming, "I'm alive."

Weiss smiled. "Yes, that is all. Except for the bruising you received when your man Filss fell on you."

"Hagen was hit? Where is he? He wasn't killed was he?"

"He is right next to you." Weiss pointed to the right. "He refused to leave your side."

Anse turned his head and was confronted by Hagen's smiling face on the pad next to his.

"Chief, it is good to have you back. I was worried for a while. I don't know what Sergeant Rau would have done to me if I lost you."

Anse could tell by the look on Hagen's face it was more than fear of Rau that had kept him close. "Hello, Hagen. How bad were you hit?"

"I got wounded in my leg. The doctor says I am healing fine and it will only bother me in wet weather."

"Who else was hit?"

Hagen's smile disappeared. "Captain Ivarsson was wounded, but not badly. He is in command here now, guarding the wounded prisoners. Linkersdorf was killed. He was a very brave man; he took over when you went down. We TacRail men emptied our revolvers, and then the infantry arrived to drive the French back. Privates Bock, Fasch and Moeller have minor wounds. Most of the rest of our people just have cuts, bruises and splinter wounds." Hagen paused. Anse could tell he was bracing himself to deliver bad news. "Chief, Sergeant Albrecht was hit bad just before you were; he is dead. We heard about it just as you woke up."

"Oh, shit. He was a good man." Albrecht left a wife in Grantville and a girlfriend in Magdeburg, but he was still a good man. Anse knew he was going to be the one to tell the women Udo wasn't coming home.

Weiss stood. "I will leave you to talk. I do have other wounded. Oh, your colonel left this package for you." He dropped a packet of papers between Anse and Hagen.

Anse used his teeth to untie the string holding them together and unfolded the top one. The hand writing was a scrawl, but easy to read.

Hatfield,

I stopped to see about you before we pulled out to chase what's left of the French cavalry. They tell me you'll live. Got some orders for you, see attached.



Don't get a big head, but you did good. Learn to keep your head down in the future. I still think you run your mouth too much, but you're one mean SOB.

That kid, Hagen Filss, saved your life, you know. Stood over you, kept firing until he ran out of ammunition. I'm putting him in for a Silver Star. You really ought to teach him to keep his head down, you know. What is it with you TacRail types?

Frank Jackson

"Damn Hagen, thank you. You saved my life."

"Not me alone. All of the men were there and the French broke when we charged."

"You still did good."

Anse quickly looked through the rest of the documents. When he reached the final page, it turned out to be part of a field order. Anse read it, then read it again.

Field Order 321 (Abstract)

31. CWO Andersen Hatfield 1TR1003VS is granted ninety (90) days convalescent leave. He is ordered to Grantville SoTF, his home of record.

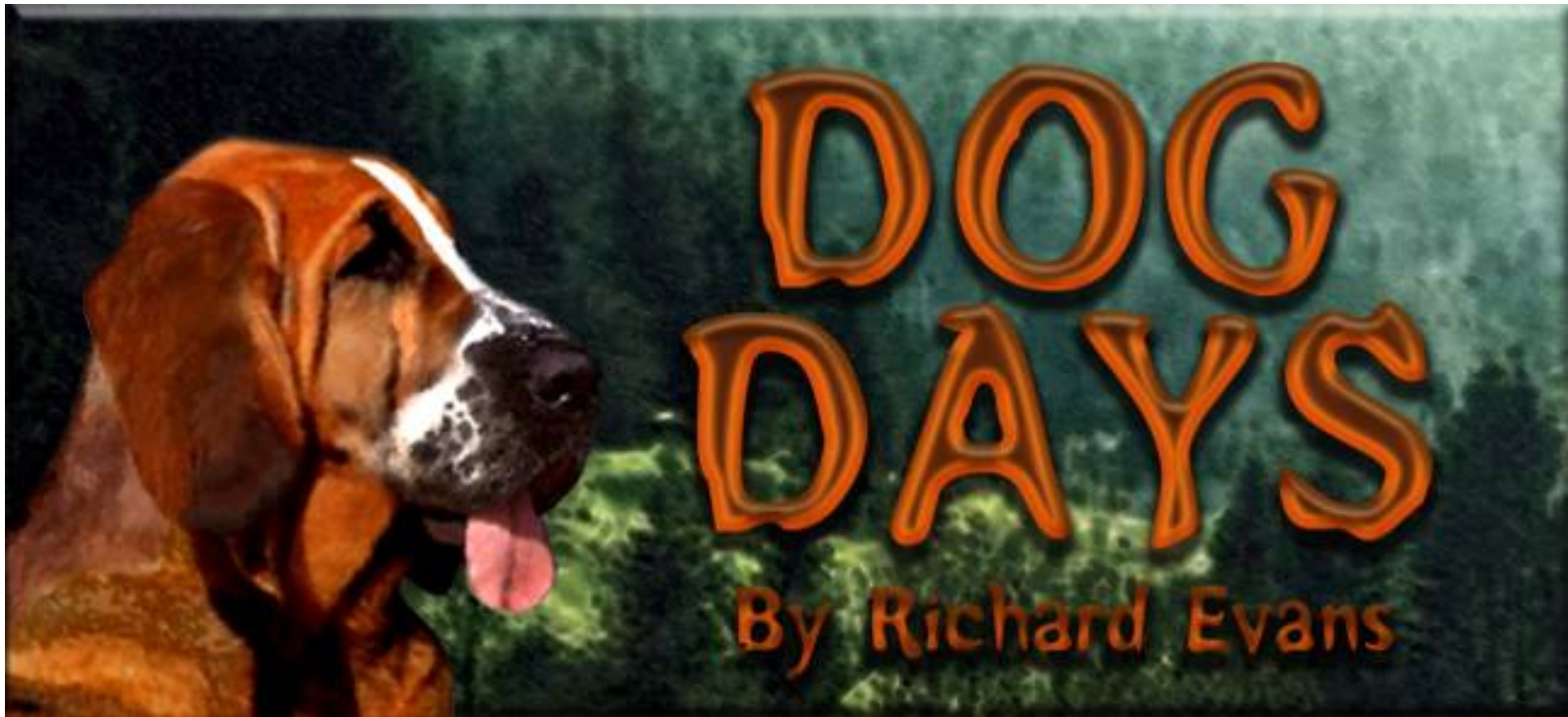
32. CPL Hagen Filss 1TR1061V is granted ninety (90) days convalescent leave. He is ordered to Grantville SoTF, his home of record.

"Hagen . . . we're going home."

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Dog Days

Written by Richard Evans



Spring 1632, Grantville, Thuringia, Germany, early morning

Old Pete sat in his favorite spot and huffed out a breath of air that made his mouth flap comfortably. He laid his head down onto his paws and watched the streets through the white wooden pickets of the porch railings. The scents of the budding flowers made his nose tickle and he sneezed. Even though it was colder than it should be with the smells of spring in the air, Pete found the sunshine just as warm as it always had been in this, his corner of the porch. That his favorite sunny spot had moved from next to the front door to over by the swing due to the Ring of Fire didn't matter to him.

Pete scanned the street once more and snuffled to be sure there were no strange scents in the air. All was good. Duncan would be home soon and then it'd be time for some exercise or he'd get to carry wood over to the smokehouse. Then he'd get fed scraps if someone came over to use it.

That'd be just fine with him. If he was lucky, he and his master could go hunting. From birds to bigger game, it didn't matter to Old Pete. He'd work them all.

Pete rolled over onto his back and let the sun warm his belly. Soon he was dreaming of chasing squirrels and rabbits in the woods just over the hills. It was a perfect day. His legs twitched as he dreamed.

* * *

The words Duncan Cunningham uttered ensured that no one would try to catch his attention or approach him as he stalked back home.

Duncan had watched others exiting the offices as he arrived. It had been nearly a year since his last visit and there were a lot fewer older folks in the waiting room this year.

He examined the exercise pamphlets and dietary plans Doctor Shipley had given him and stuffed them into his

pack. He'd lost over forty-five pounds over the last year and here she wanted him to lose even more weight or he would die sooner than later!

He'd changed his ways as best he could, but since no more medications were available, he'd had to resort to the old-fashioned ways to control his diabetes.

Diet and exercise.

If Duncan didn't start working on his plans to get insulin made, it would kill him. No way in hell was "Slam Dunk" Cunningham going down easily. He couldn't change where or who he was, but he could do something about his being a diabetic, even if he was still just type two. Sure as winter brought snow, it'd get worse with time. Now it was up to him to get an insulin project started to make the medicine he'd soon need.

To Duncan it was a matter of life and death, but the city council and emergency board last year had said no—no funds and no way to make insulin. No place or people to spare to make it, either. More important medicines that would save people, including him, from pestilence took precedence.

"*God damn their DDT.*" He slammed a beefy fist into his large hand. A hand so large that could palm a basketball as easily as someone's face in a fight.

He had no idea how much making insulin would cost, but the numbers were bound to be high. Higher than he could afford, straight up. At least his credit was good. It didn't hurt to be related to nearly everyone in town at times like these. What he'd read so far about insulin purification seemed simple, but there were so many obstacles and sundries he'd need to get it started. He knew he wasn't the man to make the insulin, either. One more problem to overcome.

Duncan knew he'd be in competition with the high school, the new hospital they were building, and even other facilities for some materials, and he didn't even have a tenth of an idea of what all he needed to produce the insulin.

It'd be a busy morning visiting homes and trying to trade unneeded items. He'd have to start small and work his way up to getting the gear for a lab dedicated to purifying insulin.

He'd show Dr. Shipley. He'd show everyone that Duncan Cunningham wasn't a quitter. Not now, not ever.

He wasn't going to die . . . but first things first.

* * *

Duncan sat down on the front deck's steps to rest. It'd taken several trips from the hired wagon to move the small hoard of items he'd managed to trade for that morning. Mostly they were items his imagined lab would need. It was going to take days to sort through it all to see if the stuff could be converted to be useful in a lab. Converting a child's ancient record player into a centrifuge would be tough, but the library or someone he knew would know how to get it done.

Selfish or not, the insulin, when it was made, would be *his* first. It was going to cost him enough money and time. Time he was short on, even today. It was almost noon and he still needed to put meat in the smokehouse. He owed too many people too much already.

He'd felt his next door neighbor's eyes following him when he unloaded the wagon. He suppressed the urge to give her the finger. Kitty Ann Chaffin was too nosy for anyone's good.

Duncan had friends he did favors for sometimes, no questions asked, and they'd returned the favor when he asked for help this morning. Though it meant that he'd have to babysit five or six kids, mostly pre-teens, this weekend in return. He didn't mind children; it was adults that got on his nerves easily for some reason. Duncan loved children, and the birth of his grandchild, Noah, had made him ecstatic. Word that Gayla was trying to have a child, too, made him even happier.

He grunted. "Well, Pete, it looks like we're not long for this world if Grantville can't get its shit together. And here I am, out of work with an empty house." He scanned his double wide that was anything but empty. There was over thirty years of his and Linda's collected life here.

"Wish Linda had come down-time with us; she'd know what's worth what in no time." Duncan sighed. "You're gonna be one spoiled dog for a few months as I clean out the junk food I was saving, if I can't sell or trade that stuff first."

He glanced over his shoulder and saw Kitty's curtains move again. There was a woman God should have found a way to leave up-time one way or another.

Duncan scratched his faithful hunting dog's ears and grinned as Old Pete's tail thumped the wrap-around wooden deck. The sound reverberated like a Japanese demon-drum. Old Pete wasn't a small dog by any means, by luck more than intention. He might actually be a bit bigger than a St. Bernard and easily pushed two hundred pounds of muscle, tooth, drool and fur.

Somehow the loyalty of his half-breed father had been passed on to Old Pete in spades. It was too bad a coal truck had taken Pete's father out five years ago. There were only two other dogs in town he knew of that were directly related to Old Pete.

Old Pete had the instincts of a hunter. He knew when to move quietly, and how to push larger game towards the stands Duncan and his friends set up in deer season. So it had usually ended up with friends inviting Duncan and Old Pete to hunt, and leaving their own dogs at home.

"Well, we're not going to spend the rest of the day moping around, Pete. Freezer's gonna need filled again. Let's get a move on."

Pete knew what the words "freezer" and "filled" meant. It was time to go hunting again!

"Still have some bounce in you, do you? If you do, old boy, so do I." Duncan hopped to his feet to prove that point to himself. "Hah! I still got the moves!"

Old Pete's thunderous barks were punctuated by even more bouncing and shaking of the deck underfoot. "How about a big ole pig? I hear that there are some running wild in the woods near the marsh lands towards Badenburg, harassing folks. Be a long walk, boy. We'll pack for an all-nighter, just in case."

Normally no one went hunting alone, but time was short and the day wasn't getting any younger. No time to make a few calls or visit the store for a pick-up hunting partner.

Duncan pulled out his small game shotgun, an over-under .410, and pocketed a dozen-and-some small game shells and a similar amount of heavier slugs for the gun. It wouldn't be anywhere near powerful enough to take down a hog, especially if the rumors he'd heard were close to the truth, so he reached for his favorite handgun and holster belt.

The Taurus was a very heavy handgun. The belt held three quick-loaders in a pouch with the same ammo in them and twenty rounds in leather loops on the belt.

Every hunter in Grantville had gotten a lesson in seventeenth-century hunting laws soon after the Ring of Fire. Luckily, animals didn't care about borders and moved into the areas the locals could hunt without offending or breaking a local noble's laws.

Meat was meat.

He put on his Indiana Jones fedora. That had been a Father's Day gift from Noreen after the family had gone to see *Raiders of the Lost Ark* so many years ago. Before she'd had to be committed for her own safety.

A tear threatened to fall, but he bit his cheek. It wasn't his fault Noreen had lost it mentally after the Ring of Fire, but at least she had good care. His other daughter, Gayla, and quite a few friends worked at the facility where she now resided.

He wore the fedora proudly and had even added a timber-rattler's skin band to it after the snake had made the mistake of announcing itself where Old Pete could hear it.

Duncan reached into a cupboard and packed two instant Gatorade mix packs from his dwindling supply. That was one purchase he'd never regretted, but he hated the grape flavoring, so it had lasted longer than anyone would have guessed. For a diabetic on a sugar crash, the instant mixes were the nectar of God.

Knowing he might be out past dinner, he made sure some homemade jerky filled other pockets. He filled his medicinal flask with some snake-bite juice, then grabbed the first-aid kit and finally moved out. One glance next door and he barred the dog doors from the inside, then locked the doors.

As much against thieves as inquisitive next door neighbors. One in particular, especially.

* * *

Old Pete had spooked quite a bit of small game on the way to the Ring by Birdie Newhouse's farm, but Duncan had only bagged three decent rabbits and two keeper squirrels so far. He'd fed Pete the squirrels, as they were too small for the pot this soon after winter.

Now Duncan sat waiting on the game trail just past the village near Birdie's farm, watching for the patrols he'd seen signs of on his way up here. If he'd read the signs right, the patrols had passed this same area twice earlier in the day, as if following a route. That meant they were trained men and not likely to be bandits.

Old Pete growled, and Duncan fought the urge to load and close the breech on the shotgun. "Stay calm, boy. We know they're there, and now they know we do, too. Sit." He snapped his fingers down toward his side next to his six-gun and took the opportunity to slip off its safety strap. Old Pete obediently sat down next to him, but never took his eyes off the bushes to their left.

Duncan could now smell the scent of someone who'd spent the day on a horse and who didn't bathe too often. Old Pete seemed to agree, as he whined softly and sneezed.

"Well, you coming out of the woods or not? I can smell you, and so can Old Pete."

Finally, a medium-sized man stepped forward, wearing a weathered leather jack over a jacket that blended well with the trees and brush of the area. He held a small spear point down in one hand, and had a musket strapped over one shoulder. A brace of pistols was shoved into his wide belt. The man's hat wasn't too different from Duncan's, excepting the large feather.

"My name is Conrad Feldmeier. I am the head game warden for Count Ludwig Guenther. These lands are his, perhaps even those your town is upon, too." He held up his hand before Duncan could protest. "You wish to hunt these lands?"

Duncan nodded, rolling the shells in his hand.

"You must pay for the privilege then." He named a fee that Duncan knew was outrageous.

"Too much."

"Perhaps if you let us know what you wished to hunt today, we could come to an arrangement?"



"I'm here for some wild hogs I heard were harassing folks in the area, digging up gardens and fields and . . . worse." Duncan let the last word linger and watched the man's reaction. He saw the eyes narrow. So the warden did know of the hogs, then. The spear with crossbar near the top just under the long blade indicated that he'd been prepared for them, too.

"That . . . rifle? I do not believe it is big enough for a hog. Maybe a small deer. Yes?"

"It's not meant for hogs. For them I got this—" Duncan slapped his holster "—and Old Pete here." The dog huffed and wagged its tail slowly. "Trust me, this revolver will do the job."

The man, the warden, snapped something in rapid fire German that Duncan couldn't quite catch, but some words needed no translation. They were words no one would use in polite company.

"I think I like you, Conrad. I like your hat, too." Duncan tipped his own. "Wide brim is good to keep the rain off your face, ain't it?" The man's face remained impassive. "God, I wish you spoke English."

"I speak some. I learn more soon. Count Ludwig has ordered it to be. That is, that we learn the language of our neighbors." The warden shrugged.

"Well, I'll be damned. No, not that way, it's a saying in . . . ah, hell."

"This is an American thing, yes?"

"Yeah, like cussing, don't mean nuttin', err, nothing. But sometimes it does. Like when you told those two idiots to point their weapons someplace else."

The man shrugged and smiled. "You wish to hunt boar with only one dog? Must be a very good dog. He is very ugly, but seems big enough." Old Pete sat up and wagged his tail. He was smart enough to know when folks were talking about him, no matter the language they spoke.

"May I?" The warden gestured toward the shotgun. Duncan handed him the unloaded weapon and he examined it closely.

"A fine weapon, but as you say, not for pigs. Small game?"

Duncan nodded as he watched Conrad handle the shotgun carefully and then reached for it when he handed it back. "So, can we be friends and come to an agreement about what I bag?"

"We can, but I will come with you with one other man. The rest will continue looking for poachers and bandits, though few make it past your Grantville these days."

"Right. So you, me and one other, and Old Pete here. I'm guessing you both know how to walk in the woods and marshes hereabouts?" Duncan got an amused smile in return. "I had to ask. It helps to know who you're hunting with. Helps prevent accidents."

Conrad adjusted his gear. "Hermann, take the men and go patrol. Estevan, you will come with us and translate."

"Sure, Conrad." Duncan smiled. "By the way you want to try some chew?" Duncan extended a plug of tobacco to Conrad. "Just remember not to swallow and spit the juice."

Conrad didn't even blink as he reached for the offered gift.

Duncan smiled.

The Marshes

They'd been on the tracks of a pack of very large pigs for over an hour when the screams started. Before Conrad could do anything, the American had yelled something, a curse maybe, and then waved his dog to the right and charged into the brush at a speed that surprised both of the Germans. The dog had moved parallel to the man without even making a noise, as if this was a normal everyday exercise.

"We'd better go after him," Conrad said. "The count would be most upset if we let an American get killed on his lands. Maybe we can be in time to save him from his foolishness." He spat out the wad of chew.

Then the firing, squeals and barking started. Their jog turned into a full-out run. Their spears were held defensively before them, in case they rounded a tree and found themselves face to face with one of the wild hogs.

It wasn't a pretty scene.

Conrad and Estevan approached, spears out and at the ready. Duncan leaned shaking against a nearby sapling for support.

* * *

Duncan gave a signal and Old Pete circled the area and then took off. Finally, Duncan's breathing slowed down enough for him to speak.

"Estevan, hombre, we're going to need some shovels. Hogs killed two . . . two people. Before I got here." Duncan wasn't about to look any closer at the bodies. He'd seen dead folks before, but not like this. The string of curses he loosed wasn't directed at them, but at himself. He really needed to lose more weight. Had he been another twenty to thirty pounds lighter he might have been able to save one of them. Maybe.

Conrad and Estevan stared at him as if surprised he was still alive.

"Don't stare at me like that. I've hunted hogs with just a pistol before!" he snapped, surprising the game warden.

Duncan held up a hand. "I'm sorry, Conrad. I'm not angry at you. It's my sugar levels. They are too low."

"This is a disease of the blood?"

Duncan nodded. For a "simple game warden" Conrad seemed very educated.

"You did well, here. You did what you could for them."

Duncan tried to spit again, but found his mouth was too dry.

Conrad and Estevan scanned the soft ground and looked at each other. "This was a big pack, Herr Cunningham. Pardon me for saying this, but I still think you're crazy for having charged in here with just the dog and one gun. Even if you've hunted like this before. These aren't farm pigs gone wild."

Hell, the sow alone would stress the springs in the back of Duncan's huge pick-up truck if he'd ever figure out

how to get it into the truck bed in the first place. Duncan looked at the giant boar and blinked in disbelief. He'd need a tow truck to get that thing out of here. "How we gonna get all this meat out of here, anyway? Before the other hogs come back?" His share of the meat would add up to a lot of money once he smoked it and sold it. Even after he paid off the debts of the trades he'd made earlier that morning.

"My men should come to investigate the noises shortly. We should build a fire, as well. We will have them cut a path here for some horses to drag them out of the marshes and then we'll use a wagon each to get these beasts to where they can be butchered properly. The boar's head will make a fine trophy, but I think the count will claim it as it is his right." Conrad added the last part again when Duncan didn't respond.

"Or we could send Old Pete to guide them back here," Duncan added. He looked at his hands and made fists so he could hide their shaking.

"I left Hermann in charge of the men. I think you should keep your dog here instead."

"Yeah, that's fine. Oh shit! The game bag!" It was then that he saw that Old Pete had brought up the bag of game and dropped it at his feet already. He'd forgotten he'd sent Old Pete for it minutes before. Not a good sign.

"Good boy." Duncan took off his hat and poured some of the water into it and let Old Pete drink his fill. The rest dripped down his head and neck when he put it back on. It felt wonderful.

Duncan measured out a dose of Gatorade powder, and mixed it with water in the canteen's cup. He drank it slowly at first, then pinched his nose and swigged it down as fast as he could. "Gah! Ugh!" The shakes would fade soon enough. If they didn't, he'd need a power bar or another cup of the horrid drink.

"It can't be as bad as that chew you gave me, Herr Cunningham," Conrad said.

Duncan made a face at Conrad that left the down-timer laughing until more help came to deal with the wild hogs.

Count Ludwig Guenther's Hunting Lodge, early evening

Conrad sent for Count Ludwig Guenther's hound-master to treat and care for Old Pete's torn ear. Duncan didn't understand why Conrad insisted that only the hound-master should be allowed to care for Pete. It was almost as if he was insisting that the man have a chance to see the dog.

"He is the only person the count permits to care for his hounds," Conrad insisted. "Your dog has earned the right to receive the same care. That ear looks bad. Wilhelm will know exactly how to fix it so that it doesn't hurt the dog and he doesn't lose it . . . although that might improve his looks."

Duncan raised an eyebrow.

"Okay, it will hurt the dog, but he is even better than the surgeon the count has for himself. I'd bet my life on that. In fact, I have . . . several times."

"Hermann shot Herr Conrad in the buttocks last summer when he dropped his crossbow," Estevan volunteered with a snicker. He quickly found someplace else to be when Conrad shot him a look.

"So how did that work out?"

"Wilhelm extracted the bolt and patched me up. I was back in the saddle in a few weeks."

"Okay, this hound-master can look at Old Pete, but I think you have something else in mind here."

"Who me? I am a simple game warden. What confidence or secret plan could such a man as I come up with?"

"I wonder."

Duncan entertained the men with tricks from Old Pete's repertoire while they waited for the hound-master to come from the castle. Old Pete dragged one fearful volunteer across the ground from the corral to the small chapel without hurting the man. Then the man tried in vain to get up as Duncan told Old Pete to sit on him.

The men were greatly amused.

They were more amused when Duncan snatched and then threw Conrad's hat into the corral and told Old Pete to

get it. The gates were locked and the men started making bets on how long it'd take the dog to figure out it couldn't get into the corral and if Conrad's hat would be ruined by a stray hoof.

Conrad turned to Duncan. "If my hat is ruined, I will claim yours as recompense."

"Pete, *climb!*" was Duncan's only response.

Old Pete took a run at the fence, grabbed the top bar and scrambled over. The horses had already shied away from where the dog had circled one side of the corral and the hat was untrampled. Pete turned back with the hat in his mouth and waited.

"We know he can go over the fence. Anyone want to bet he can go through the gate?" Duncan held up two silver dollars.

"I will take that bet, sir," someone spoke up in accented English. "Even as big as that dog is, it can't go through wood that thick."

"Watch." Duncan turned to the corral. "Pete. Unlock the gate." He mimed lifting the rope off the post. Old Pete barked once and then stood on his hind legs and calmly nosed the rope off the fencepost, pushed the gate open, carried the hat through, and pushed it closed.

"Now I'm sorry to say, gentlemen, that though he made it through the gate, it's beyond even his skills to lock it up again. Would one of you see to that for him?" Duncan whistled and Old Pete ambled up and dropped Conrad's hat at his feet. It was soaked with drool.

The men laughed uproariously.

"Herr Wilhelm Kehl, I think you've been had," Conrad said to the well-dressed man who stood there with his mouth tightly pursed. "Lucky for you, what you owe Herr Duncan Cunningham comes exactly to what you'd charge to care for the dog."

"Very well. Before I attend to your mastiff, could you please muzzle him? This won't be painless, but I guarantee he won't lose the ear or get an infection after."

"That won't be necessary, Wilhelm. Old Pete knows it's a choice between you and Les Blocker, who'll give him a shot," Duncan explained. "The sight of a shot will turn him into a whimpering puppy every time."

"Like you and that purple drink?" Conrad offered with a smile as he shook his hat out.

"Something like that." Duncan whistled Old Pete over.

Duncan watched the hound-master prepare his gear and noticed how each tool in his kit was shining and clean. Wilhelm also sterilized his stitching needles and catgut in brandy.

Duncan pulled the reluctant dog into position and then released him with a light tap to his nose. "Stay! No Teeth! It's this or a shot, Pete. Want to visit Les instead?"

Old Pete became compliant right away. He endured having his ear washed and stitched. It didn't hurt that the hound-master fed Pete tidbits from a hip bag every few stitches. Wilhelm then applied a little pitch over the dog's wound and told Duncan not to let the dog scratch at it, but to let it peel off naturally.

As Wilhelm washed his hands, he had Duncan walk Old Pete around so he could study his lines. He asked about his stamina and intelligence. Twice, Wilhelm reverted to German to ask questions of Conrad, Estevan and the other men.

Wilhelm got even more insistent when Conrad told the story of the way the dog had taken down one of the hogs by itself. He'd seen the bodies when the three wagons finally arrived. He looked a bit more respectfully at Old Pete after that. Wilhelm took out a small book and began to make notes in it and had a very far off look.

"I think your dog is going to make you very rich, my new friend." Conrad nudged Duncan.

"You think so? He's only a crossbreed. Part Bloodhound, part Saint Bernard. All big and ugly, but a better friend I've never had."

"Whatever breed your dog is, he has impressed Count Guenther's hound-master. That is not an easy thing to do. That I was there to witness his actions on the hunt might have helped your case."

"I didn't realize that I, or Old Pete, were on trial here."

"You were, but not in the way you'd expect. Hounds like Old Pete are treasured by men like my count." Conrad named the figure fetched by a bitch sired by Count Ludwig Guenther's prize hound at the Hamburg fair last fall.

"That much, huh?"

"You have a good dog here, Duncan. I suspect you should find out if his mother is still alive or if anyone else has one of these breeds in Grantville. This would make breeding his line true easier. But whatever you do, don't take his first offer. There is a game to this business, and every game has rules to it." He shook out his slobber-soaked hat again and ambled off.

"Wouldn't trade you for all the insulin in the world, Pete. Especially since that can't be all that much right now."

"Herr Duncan, I have an offer that's sure to interest one as wise and worldly as yourself." Wilhelm Kehl smiled a car salesman's smile. Some things spanned generations. Car salesman, horse trader, or dog trader, Duncan bet there wasn't much difference between them. "I'm sure that even your hound would enjoy the work involved. But I must ask you a bit more about his breeding. Who in Grantville did you say owned his dam?"

"I didn't."

Wilhelm raised an eyebrow.

Duncan looked back deadpan.

Old Pete was going to save his life again.

Mid-May, Grantville

The problem now would be selecting the proper bitches for Old Pete and trying to breed him true. He was a mutt and getting a dog that smart and big would be hard enough. Reading about proper breeding had given Duncan a headache. It was easier to hire the experts in the end. At least there were people he knew in town with the knowledge he needed.

The extra cherry wood from his backyard plus the smoked hams, sausage and bacon from the hogs helped him pay for the initial research. A simple seven-point chart and tracking method for the breeding selections came from Les Blocker and his students. Les hadn't even charged him for the information, but Duncan made sure he got a chunk of smoked bacon and some sausage, anyway.

Duncan could sell the dogs that didn't fit the desired profiles and still turn a profit. His bank account right now wasn't liking his expenses one bit, but the loan rates at least were tolerable. According to the initial research, the St. Bernard and Bloodhound existed in this era. But none were like Old Pete. He was the best of both breeds in one huge and ugly package.

Next to the breeding charts hung a huge dietary chart. This chart covered Duncan's snack times and all the alternative medicines he'd tried to alleviate what exercise and diet alone didn't control. His daughter, Gayla, watched him like a hawk, and made sure he didn't cheat. Like he had time or money to cheat these days.

That left his most important project—the insulin. He'd arranged to lease space and lab time at the Manning Assisted Living Center through old Dr. McDonnell. The location was undergoing expansion to handle the massive influx of needy to Grantville, and was also acting as something of a municipal hospital for the poor.

Manning's was already starting to acquire hospital gear and medicines made through a front company in-town called Manning's Medical Manufacturing or Three M. Insulin wasn't on their list of projects, so Duncan's project would have to be self-funded, and he'd have to invest heavily in Three M to make sure he could keep access to the facility.

He put down some alchemist's notes he was trying to read when Old Pete growled. This time he heard a wagon entering his driveway. "Please, God, don't let it be another brown-noser looking for a favor! I don't think I could take it." Duncan snapped his fingers, calling Old Pete back from the door. He'd heeded Conrad and Wilhelm's

words of caution to not get involved in any of the games Count Ludwig's courtiers played.

Next door, the curtains fluttered and Duncan hid his smile. Kitty's last petition to close down his business had been stomped on pretty hard by the new Small Business Bureau group—which was seeded with many of Duncan's old buddies from the mines and not a few extended family members.

It was good to have friends and family.

Something about sheep or animal pancreas processing circled in his mind, something one of his researchers had mentioned, but the words were buried in the barking of over a half-dozen large dogs in cages on a wagon out front.

"Take them around back and stake each of them out separately so I can examine them, please. They are in heat, I take it?"

Dogs to Dollars, Summer 1632

"The count won't be happy that you rejected three of his best bitches, Duncan." Wilhelm took the breeding charts that Duncan waved at him and Conrad. Conrad ignored the charts and went in the house, probably to use the john, so Duncan kept talking to Wilhelm.

"It's genetics as much as it is the person who raises a dog that makes it what it is. For me to be able to breed Old Pete true, I need to get a good breeding stock base that shares the features we want to continue in his line. Les Blocker, the veterinarian, agrees with me. We need at least four generations of good stock to guarantee a good breeding pool." Duncan winced. "Unfortunately, I think ugly is the one gene that's going to breed true, no matter who we pair him off with.

"Are you sure that we can sell the pups I don't want to keep in this program? Feeding this many dogs is going to be next to impossible for me. They need to be fed a lot to grow properly." Duncan looked at Wilhelm. "I'm also looking after my daughter Noreen, you know, and even with Gayla's help. . ." He made no mention of the fact that his son-in-law, now a very wealthy man, had ensured that Noreen had enough money to cover all expenses at the care center. He hated Chaffin and his mother, Kitty Ann, with a passion.

"But if I can sell our rejects, it'll go a long way to covering basic expenses and spreading the gene-pool. Some of the dogs will be good at some things, but not like Old Pete, which is what we're aiming for right?"

Wilhelm simply nodded when it sounded like Duncan was on a roll. Interrupting the big man wasn't something he considered a healthy risk

So he just followed along as best he could, and watched where he stepped in the backyard. A skill a man of his duties normally could do with out a thought, but these were big dogs and the puppies ran free in the huge backyard.

"I have another surprise for you two and Count Ludwig. I acquired another fine pair of breeding dogs for him a couple of months ago. They've already pupped, too. Fast breeders." Duncan walked him around to the back of the yard well away from the house and regular kennels.

"What the hell are those?" Wilhelm asked, jumping back when two tiny wiry-haired dogs leaped at the chain-link fencing that kept them inside their small run.



"Those, Wilhelm, are a pair of Rat Terrier-Chihuahua hybrids, the fiercest yappers in the universe. They are supposed to be the bane of rats anywhere, but bred small enough to be the lap dogs of ladies and gentlemen in what was my world." Duncan kept his voice serious. *Who'd want one of those things sitting in their lap?*

"My God! Don't they ever stop yapping? It's so high pitched and annoying! How much did they cost?" Wilhelm started to draw his new pistols. "I'll pay you twice what they are worth if I can just shoot them! Why would the count want such annoying dogs?"

Duncan put his hand on Wilhelm stopping him mid-draw. "I didn't say they were for the count himself. They're meant for him to pass out as gifts."

"Who in their right mind would give these noisy creatures to anyone as a gift?"

"Wilhelm, my friend, for someone who spends so much time in and out of court, I'd think you'd know how to play their game better." Duncan bit off his smile before it could form. "Who said that Count Ludwig would give these dogs to people he liked?"

"You are a wicked, wicked man, Duncan." Wilhelm smiled slowly. "I am sure Count Ludwig knows more than a few people who are deserving of such a fine gift of a rare up-time dog. I don't think two will be enough, though. Could you breed more of them? I only count four puppies."

Duncan winced but nodded. "It'll cost you. Feed, care, fighting the urge not to strangle them . . . I'll be sure to emphasize that they're fearless, determined, energetic ratters on their papers, too. At least that's what their ancestors were bred for, or so I read." He passed Wilhelm a photocopy of the two breeds' selected histories along with a notarized statement from Les Blocker. "I'm sure you can work with these to come up with something that would impress a courtier whose nose is so brown he can't see without help of a lantern."

Wilhelm looked at the two tiny, hyperactive dogs again. "And how soon would these pups be ready to be separated from their dam?"

"Separated from their dam? My good man, you're taking them with you when you leave tomorrow. I'll keep the parents to breed, but the pups were weaned last week." The look on Wilhelm's face was almost worth as much as the coin Duncan suspected was in the man's pouch.

"Wilhelm, I'm gonna need you to come by at least three times a week to see that the boys are taking the dogs through their training paces and keeping the yard and pens clean. Conrad and I are off to Hamburg for the

Summer Fair. We're taking most of the rejects and some of the true breeds with us. Conrad wants to visit his cousins while we're there, and says there's someone I just have to meet.

"I think he wants me to meet this merchant I've been arguing with about prices. We've exchanged tons of letters since the topic of the Fair came up. He says I'll be glad to meet this merchant. Someone close to his own family is all I can get out of him.

"Stubborn as hell, and demands to see the dogs before deciding on a proper price. Not even the letters and sketches or affidavits have sold him on how good Old Pete's pups are. And they are only buying two of the pure breeds to begin with! For some reason, I think Conrad's setting me up for another joke. Man's full of secrets."

"Who, me? I'm just a plain old game warden, Herr Cunningham." Conrad walked up with his eyes twinkling.

"Good cider, this. Think I'll get a refill and some for you two, too." He turned to go back inside the house. "And remember I didn't say it was only the dogs you were bargaining about, Duncan. Just that the deal included two of the true breeds. Be sure to bring those clothes the count was nice enough to have made for you for when we are at the fair. You'll make a better impression wearing them."

"I'll look like a damned peacock, is what! He better be right or I'll show you a move I learned watching wrasslin'!"

The rear gate slammed open and a kid from the neighborhood called for Duncan as he ran towards them. "Mr. Cunningham, Mr. Cunningham!" He tried to yell over the barking of over twenty dogs. The boy slipped through the muck in the back yard and landed at Duncan's feet with a splat.

Duncan picked him up easily. "What is it, Tommy?"

"Your alchemist. The one learning stuff up at the school? He's. . . he's . . ." The kid looked at the note he held.

"Absconded. With everything, all your research papers and some of the Three M lab equipment, too! They're still doing an inventory!"

Duncan sat down hard, feeling like he'd been gut-punched.

Conrad turned to the boy, "The police? Have they been informed?"

"They sent me with the note, phone was busy. The high school called it in. They thought maybe he was taking a sick day or was down at the lab and sent someone to check on him and everything was gone! They are still checking what's missing from Three M's labs."

* * *

"Don't worry Duncan, we'll get him." Conrad's voice chilled the summer air. He had taken the phone off the hook so Duncan would have one day of peace at least. Now it was up to him. He owed Duncan that much. "He can't have gone far in a day."

"Conrad, we can't kill him or let him hang! He's the only one that's been able to make any insulin so far. Three M's techs were working on a better way of purification for me. He's still too important."

Conrad left his friend sitting in the mud with Old Pete and his pups licking his face. This was one thing he couldn't help his friend with directly, but he did know some people. Time to round up a posse, as Duncan called it. He trusted his men and their new dogs more than any others to deliver the fleeing alchemist alive, no matter how long it took. He cleared Duncan's phone line and pressed the button marked "Police." The phone beeped three times and there was a click as someone picked up the phone on the other end. It was a familiar voice.

"Hullo, Mrs. Clinter? Yah, this is Conrad, I'm over at Duncan's. Yes, we've heard. I need one of your men to describe the fugitive to my men. They will be by as soon as I can call the castle. No. I won't be going along, and neither will Duncan.

"We're due in Hamburg shortly, north of Jena, so we must leave soon. Perhaps even as early as tomorrow. Send me the bill for the posters and pamphlets. This thief now has a bounty on his head which will be paid for live capture and delivery only. Yes, I'll guarantee the bounty. Even if I have to pay it myself. How much do you suggest?" Conrad listened for a few minutes, then interrupted.

"I don't know about your local prosecution, but would forced labor be a just punishment? So what's the difference

between his working supervised at a lab during the day and cleaning up shit off the streets at night? *Danke*, Mrs. Clinter. I must make some more calls now. Expect my men soon."

Grantville U-haul and Salvage Facilities, early fall 1632

Dalton Higgins picked up a book and a calculator that had seen better days and started adding up some numbers. "No way we can make full value of this truck in two weeks, Duncan. Would a quarter now and the rest in quarterly payments be fair?"

"That will have to do. I need to buy some new equipment and Three M stock, soon. Before they vote my personal projects off the table and reassign the labs and lab time while I try to recover my insulin project.

"Conrad's men got the runaway alchemist back for me pretty quick, but not before bandits stole or broke the gear. Figure it's going to cost me either way. I rather be safe and have the cash and stock to back my requests."

"Would letting you vote my shares in proxy help you, Duncan?" Dalton asked. "My daughter suggested I invest in that company and I might have—" He coughed. "—a few shares to vote."

"You'd do that for me, Dalton?"

"For that truck and Linda's ATV, and paid back over time? Yeah, I would."

"You'd be saving my life, Dalton. Literally."

"It can't be that bad yet, Duncan. I heard you whupped Mr. Chaffin pretty good down at Tip's recently, for how he's treating Noreen."

Duncan half grinned and turned away to hide his blush. He was really too old to be stuffing men into trash cans anymore, but it sure had felt good to do it. He turned back, serious once more. "Doc McDonnell came up with a blood test for me after we started to get some insulin made. Mostly to monitor how it was affecting me. I'm sort of a living guinea pig, but I ain't got no choice, you know." Duncan unhooked the keys for his beloved four by four truck and his lost wife's ATV and handed them over. "The proxy votes and the papers saying I can vote them as I see fit, soonest. The rest when you can afford it. Richard Nelson, my lawyer, will handle things while I'm gone.

"By the way, gents . . . when's the last wedding you went to?"

"Why?" Harrison asked.

"I found a keeper, and I don't want to let her get away. I'll let you know 'bout that after I get back from Hamburg again. Seems I have some unfinished business there." Duncan actually smiled for the first time that day. It felt good. "Speaking of that. Think I could borrow one of your newer luxury-ride carriage prototypes?" It'd make traveling the roads bearable and he wanted to impress the lady. He was sure Conrad would know someone who knew how to drive a carriage properly.

It was good to have friends.

Late fall 1632, Grantville

"What do you mean you're getting married, Dad? Who to? What's her name?" Gayla reached for and unlocked the bottom drawer of her desk where she kept the cherry syrup she made herself. With news like this, her herbal tea was going to need a little extra sweetening.

"No, I'm not mad. I'm just surprised. You sold how many dogs? You're kidding, only four?" Gayla dropped her cup of tea when she heard how much money her father was bringing back home.

"That's a lot of money, Dad. And you sold futures on twelve more trained pups? Jesus, that's a lot of money. Are these people crazy? I guess that's why you wanted to borrow my Chihuahua for that other experiment of yours?"

"What are you going to do with it all? More insulin and purification research, I hope." Gayla swallowed hard.

She'd done what she could with her connections and training to keep him in good health, but she'd known all along that it wouldn't last, not unless he found a source of insulin soon. Dad was taking enough of a risk trying the stuff without sufficient testing on rabbits, rats and pigs first. It wasn't enough in her book, not by a long shot.

"Yes, Dad, more funding would be a good idea, especially if they get more trained alchemists and lab-techs out of the deal.

"Just be sure you pay off all your own bills first, before you go and spend that small fortune you just brought home with you. What do you mean you got rid of your truck? That had to hurt.

"Dad, you're doing it again. Talking about everything except what I want to know about. So tell me about this woman, Father. What? She's younger than I am! No I'm not jealous, but . . ."

She glared at a co-worker who was standing close enough to overhear her conversation. "Don't you have something to be doing? No, not you, Dad." Her co-worker scooted off, whistling the opening bars to the wedding march and Gayla stuck out her tongue at her.

"Yes, I'll get the family together. Where do you want the reception? Marcantonio's? Go figure, you've always had a weakness for his pizza. Dad? I'm glad you're happy. Yes, I'll help. And where are you calling from? Madgeburg by radio with a telephone patch at central? Next Tuesday? That's too soon!" Her eyes narrowed. "Dad, why do you have to get married so soon? No. I don't believe it's part of a business deal . . . Dad! I don't need those details! "Can she stay with me until the wedding? Of course, she can. She's going to be family, isn't she? But, we're going to have a talk about the menu when you get here . . . just because it's your wedding, you're not going to stray from your diet." Gayla mopped up the tea from her dress and barely bulging stomach.

"Noah misses you, Dad. He reminds me every day about your promise to play some round-ball with him when you got back in town." She listened to his response through the static. "Yes, I think Noreen would love having flowers in her room. Just don't go nuts. I don't care if the dogs are selling for that much." Her dad was as good with children as he was with dogs. That made her life easier, since her nephew Noah had moved in with her, instead of living with his philandering father. Duncan spoiled Noah to no end, though.

No chance in hell of Kitty Ann Chaffin offering to watch the boy. His grandmother was afraid that Noah might throw one of the fits Noreen was capable of occasionally. Kitty Ann even feared Noah might infect her. It was too bad Kitty Ann was her father's neighbor, but that's how Noreen had found the boy she'd eventually fallen in love with and married.

"Okay, Dad, I think I can manage that much. I found some more medical books you'll want to borrow. Oh! Can you believe they're making me learn Latin now, so I can talk to the doctors that come through here and read their orders and talk to them?

Gayla listened through the buzz. Drat, that was annoying.

"Really? You mentioned her family's rich, but they deal in sugar, too? What do you mean she's bringing a sweet dowry with her? When? She's with you in Madgeburg already? Dad!

"I can't do it all, I'm pregnant, remember? Let me talk to my future stepmother. Don't you mind what us girls are going to talk about. You just remember to get that glassware you needed, and pick up the gears they ordered for the centrifuges at the lab. I still got the list right here. Or do you want to pay to hear it again?"

Gayla spent the next three minutes meeting her stepmother-to-be. They talked about what the bride wanted for her wedding. Gayla made sure to remind her to berate Dad about his diet. She took notes without realizing it.

She also told her about his disappearing for days at a time, sometimes, with one of his local friends named Conrad. He was a cousin? Before she hung up—at the insistence of the operator who said that there were others waiting to use the line—she finally got her name.

Sophia Walker. Half-English, half-German, and all stubborn. She wasn't Mom, but maybe she was what Dad needed to keep him focused.

It had been her eyes, Dad said. Big. Blue.

Gayla stood up slowly and arched her aching back. This was her third try at having a baby since the Ring of Fire. She hoped she was able to keep this one past the first trimester. "Ugh."

"Someone's getting too fat for her own good." A cheerful and familiar voice came from the reception office's doorway. "Oh! Fresh tea, just what the doctor ordered."

"Dad's getting married, and guess who got volunteered to set things up?" Gayla harrumphed over her shoulder at her friend and co-worker.

Gwen Higgins was due a baby of her own near Christmas and well knew what Gayla was going through. "If you can put together a rotating four-shift schedule together for this place and make it work, then putting together a wedding and everything that goes with one shouldn't be much of a challenge." Gwen smiled and eased herself into the desk's seat and adjusted the lumbar support with a sigh.

"I'm sure Duncan's done right by himself and who says it was him who picked her? Bet on the woman every time. Men are easily kept in line, too. Now scat, you got a nephew to pick up from school, don't you?" Gwen mimed a pinch and Gayla giggled.

Gayla wondered what type of woman would put up with an old bear like her father who was so set in his ways. Nearly everyone thought he was a major bully or just plain pushy. Then again, what type of woman could capture her father's heart in two week's time in person and over a summer's worth of letters that were gender neutral and argumentative as well?

Sophia must be a real looker and smart, too. Dad probably didn't stand a chance. For some reason that thought made her smile even more. Dad definitely deserved a second chance.

Late fall 1633, Duncan's house

"Count Ludwig is that pleased with the new breed of dogs you have created, Duncan. Very pleased." Conrad smiled over the bourbon on the rocks and swirled the glass slowly, letting it clink. It was snowing outside, the fireplace was roaring and some of the trained dogs were scattered about the floor, giving undisputed room to the biggest of them all, Old Pete.

"I think Old Pete's eyeing your boots again, Conrad."

"I believe you taught him that trick, Duncan. Like I said, the count is pleased. The dogs you trained not only flushed enough game to let them feast well during his last hunt, they pulled a guest out of a half frozen pond. He couldn't ride or swim. I'm glad to say both the dogs and man survived the ordeal. He was an important guest. A Swiss historian and academic philosopher, who's interested in the changes you folks call the butterfly effect. Not exactly the type who should be out hunting, but he wanted to try it at least once. It was almost his last time, except for the dogs reacting before anyone else did."

"He wants a dog of his own, right?" Duncan guessed.

"Not only for himself, he wants to gift at least a dozen breeders to the Benedictine monks near Liestal, especially those dogs who show good rescue instincts. He is willing to pay twice the going rate to introduce the breed to the area, or part of it at least. He's read about rescue dogs and the origins of the Saint Bernard and the hospice at St. Bernard Pass. And about the similarities of the bloodhound to the Swiss Jura Hound, too." Conrad grinned behind his drink, which lent him a Cheshire cat-like quality.

"I guess someone's done some research into part of Old Pete's background, or been told a tale or two . . . Twelve dogs would be almost half my breeding population. Though over half of the bitches are expecting again . . ."

Duncan pulled out his breeding book and started checking some dates.

Conrad handed over a contract and Duncan whistled softly at the initial offer. His wife, Sophia, came out of the kitchen where she'd been preparing dinner. A quick peek out the curtain overlooking the backyard and the dog pens, then she finally came into the living room.

"Sophia, dearest, can you read legal Latin? I need this contract checked and to see if the buyer's willing to follow my rules and our breeding requirements to the letter." Duncan demanded those clauses of anyone who bought the dogs.

"You need to name the breed too, Duncan," Conrad interjected. "Calling them Duncan's Dogs isn't working anymore. You're just not famous enough, but stories of your dogs have reached even Vienna." With that said, Conrad made another contract appear, this one with many official looking seals and ribbons on it.

Sophia pocketed the contracts and then whispered something into Duncan's ear. At first he smiled broadly at Conrad, then he blanched white when what she told him sunk in.

Conrad was at his side in an instant, as was Old Pete. Some of the more sensitive dogs also turned and whined.

"What's wrong, my friend?"

"Well . . . umm . . . how can I put this?" Duncan looked up at his wife and his eyes teared up. He was at a loss for words. A rarity amongst these two friends.

"I'm expecting, cousin. I am due early in the spring. I just hid it well, even from myself." Sophia smiled. "Now do as you promised." She kicked Duncan's ankle and pointed at the two sleeping boys by the fire. "Wake young Noah and get him washed up before dinner."

"Oh yeah, Conrad . . . my friend . . . I think it's time for starting dinner and for your own son to wake up too. He's got pooper-scooper duty today, doesn't he?"

Conrad coughed and finished off his drink quickly, then poured another and sipped it more cautiously this time. "I think you're right, Duncan. He'll earn his meat tonight."

"Try a better way of waking him than what you did last time. Tossing him into the yard to slide until he hits something that wakes him up may not be the best method." Duncan chortled. "Messy, too."

"What can I say? The boy's lazy. How does he expect to impress a fine young woman into marriage, if he won't even clean up after the dogs and sleeps all the time? Who'd take him as an apprentice breeder?" Conrad caught Duncan's eye and gave him a significant look.

"Who me? Thought never crossed my mind. I'm too busy trying to get clean insulin that we can store at home in the freezer. The stuff we have works, but we can't control how strong it is from batch to batch yet. They're working on some new tests and refining the processes. The animal testing has gone well. Very well.

"Meanwhile I got to go to them for a shot every two or three days for a whole month. Just so they can get a baseline on my blood after I eat a special meal, which isn't much better than your own cooking, Conrad. They cut the insulin with saline and stick me over and over until they think I got a proper dose. Got to sit there for hours with them watching me and running tests. I can't wait till they perfect the process. Then I can have medicine I can count on. Then my life will be normal again."

"Oh. So that's why you can't go on long rides anymore?"

"Yep. Though I like the idea of Sophia babying me in bed for a week or so . . ." Duncan feigned dodging Sophia's slap and laughed.

"Wasn't our honeymoon enough for you, you old . . . dog!"

"Woof. What do you expect of me, darling? I'm a breeder, not a baker. Though things still do rise in the morning . . ." Sophia snorted a laugh and went back into the kitchen. "Wake the boys, Duncan. Time's short."

"Okay." Duncan turned his attention back to Conrad. "I'll make an appointment next week to open discussions with the visitors, but they don't see each other until after I meet with them. That way they can't compare or tag-team me on prices or work out a way to try to sneak out of contract details. I'd prefer they stay ignorant of each other too, in case I go easier on the monks. But before that we'll need a name for the dogs. Right? Sophia will help me with the Latin. It'll give me something to do over the next week or so." Duncan thought a moment, his lips quirked. "How about Bigus Muttus?"

"Never. I know that word mutt."

"I've always been particular to the Duke, that's John Wayne, and he played a Marine in many movies, maybe something with *Semper Fidelis* in it."

"We'll write that one down," Conrad said. "Though I'm thinking they want a proper name in Latin, Duncan. Dog is *Canis*, I think. Perhaps you can blend something out of their old up-time breed names?"

Conrad stood up and moved over to where his son was snoring away near the fire.

"Conrad, I don't speak Latin. 'Cept what's on the back of some of our money, you know . . . 'Ye Plumber's Union.'" Duncan caught the pillow Conrad threw at him and sent it right back. Conrad deflected it and it hit his sleeping son. The boy woke abruptly, looked at the clock and, in a panic, ran outside barefooted. He was back inside in less than a few seconds.

"It's snowing outside," Conrad's son chattered. "Hard!"

The wind rattled the windows and the snow seemed to pick up. "Looks like you two are stuck here for the night again, Conrad. You get the boys to wash up. You can call the castle later.

"I guess we're having two more for dinner, Sophia." Duncan said as he walked through the now empty kitchen. He looked around, but his wife was no where to be seen. A short search found Sophia and Old Pete's favorite bitch, Helga, in the guest bathroom.

"Duncan! She's birthing! Thirteen pups so far! She might hit fifteen. Hang on Helga, you can get through this . . ." Old Pete came and sat down next to Duncan and wagged his tail. Soon the woman shooed Old Pete and his master out, as they only got in the way. If they all lived until spring, Duncan might be able to meet the Swiss order by summer, after all. Helga and Old Pete always bred true.

"Husband! What are you looking at? Go get dinner started, and you, too, Conrad. Both of you! Be sure to wash your hands first or I'll chop off your little fingers!"

"Don't say a word, Conrad, I think she means it. Probably use our dullest blade or a hatchet," Duncan cautioned with a smile.

"We need a name for the dogs, Duncan." Conrad aimed the boys to the other bathroom down the hall and began to wash his own hands at the kitchen sink.

"We'll come up with one. You heard the lady, dinner first. Now you peel the onions, carrots and garlic and I'll go get some rabbits from the freezer outside to defrost in the microwave." Suddenly the kitchen was filled waist high with Old Pete and five of the other indoor dogs and their already grown puppies. "I'll go get some boiled rawhide for the boys to chew on so they leave us alone while we cook. And don't you dare give any of them onions; it makes them fart."

Conrad smiled. "A name, Duncan, or else. . ." He waved an onion above the dogs.

August 1634, Tip's Bar

"Got a request for seven more of Old Pete's pups today."

"They're offering a lot of money, Duncan," Conrad said as he read the letter Duncan handed him.

"Yeah, they are. That's the problem. I want to be sure my wife and children are taken care of after I go. That's a lot of money, but maybe I'll sell them to the Benedictines that came into town last week, instead. I hadn't thought they'd make the trip up to pick up the dogs themselves. Should give em a discount for that at least. I figure I can afford to right now."

Of the fifteen dogs that had been born to Helga that winter, three had died and two were rejected due to hearing problems. The nearly deaf dogs had been donated to the Assisted Living facilities for pet therapy once they'd been housebroken and socialized to deal with older people.

His other project still only produced a trickle of medical grade insulin, but it was enough for now. Diet and exercise still mostly made up for the difference. But Duncan's eyesight was starting to suffer. He was now

smoking a bowl or two of pot a day as a preventative for glaucoma and for the pain that occasionally wracked his legs. He'd secretly taken to wearing Linda's old pantyhose too, to help his leg's circulation. For his left eye, it was too late. All he could see from that eye was blurs.

"Pain getting that bad?" Conrad asked.

Duncan nodded. "Don't let on to it, though. The new insulin, the pot, and other elixirs I'm getting out of Manning Medical Manufacturing are keeping me going for now. But for how long, I don't know.

"They may not like it, but I own over a quarter of their shares and have built and paid for the last two labs at the facility so they can do more research and make more medicines. That research is keeping me alive. Sophia's noticed my change in focus since . . ." Duncan's face cracked in a wide smile. "She's expecting again, Conrad. Surprised us both, being that she's breast feeding and just had Duncan Junior four months ago."

Conrad slapped him on his back. "That's a nice surprise, my friend!"

"I've put up posters around town, seeking more alchemists who want to further their education in exchange for work at the Three M Insulin Labs. Kind of a scholarship with a work caveat. And that bastard at the rendering plant just doubled the price on pancreases again. That's the third time this month and who knows how many times since I started the insulin research.

"He was using them to make sausage before, for God's sake! I got them for cheap before, pennies a dozen, and now he wants to charge me an arm and a leg! Someone's let on that I need the stuff to live and he's taking advantage of it."

"The butcher plant you speak of is just outside this city's jurisdiction I believe." Conrad smiled. "The factory is on lands of a good friend of ours, is it not?" Conrad mimicked someone wearing a small crown. "We'll have a talk with him. You stay out of it. You definitely do not need the stress, Duncan.

"Nothing illegal of course, but I'm sure a few surprise health inspections might make him more amenable to dealing properly with you. Now. About the breed's name?" He'd been hounding Duncan for months about this subject.

"Canis Bonzo Buckaroo?"

"I'm serious, Duncan."

"Nice to meet you, Serious. Here my best friend lies to me for all these years and tells me his name was Conrad."

Conrad sighed. When Duncan, took his pain medications he got silly.

He called a coach and took Duncan home.

September 1634, Duncan's home

Duncan sat and read and re-read the letter that was heavy with seals and looked up at Count Ludwig and the three officials that arrived with him. On the table sat a small chest, unopened, but it had taken two men to bring it inside. Considering the guards outside, it probably contained a good bit of gold. Being polite, Duncan didn't open it, but his hands itched when ever he looked at it. His wife, merchant born, eyed the chest like a hawk as she fed Duncan Junior.

They'd just returned from their second honeymoon, taken before Sophia's new pregnancy made travel too difficult. They'd inspected the land and village that the count had arranged for the Cunningham family to buy at a very good price.

Duncan had immediately turned over a large chunk of the land to the training and breeding of the dogs. It was less than fifteen miles to the south of Grantville as the crow flew, but like so many towns, it had been war ravaged until it was all but deserted. The influenza breakout the previous winter had finished off most of the remaining residents.

Now renamed New Petesburg, after Old Pete—who'd made the purchase possible—it housed a larger kennel and

the training facilities for the dogs and housing for the trainers and their families. A dog's temperament and intelligence would determine its training and eventual selling price, so they got the best he could afford. That only left the chest on the table and the three gentlemen who had come with the count on an unofficial-official visit.

"So, Alamo saved a boy's life and then went back into the river three more times for the rest of them and finally pulled out his mother, too? All while under fire?" Duncan bit his lips to keep from crying. He was close to all his dogs. "Did they get the bastards that threw those people into the Rhine?"

"Yes, Herr Duncan, they did. Horn's men witnessed it in time and saved the Benedictines, some refugees, travelers, merchants and the rest of the dogs, but Alamo . . . they couldn't do anything for him. He'd been shot twice already, and the rocks and currents . . . He died in the boy's arms giving him the last of his warmth. This might cause some problems later, Herr Duncan."

Duncan sniffed, "How's that?"

"Someone raised a chapel at the site and sent a petition to the Vatican to see if they could canonize the dog. Said they witnessed angels helping the dog, but in the smoke of battle panicked people see many things."

"That's silly, Catholics wouldn't . . ."

"The boy and woman your Alamo saved were very important and very well connected to the Church. Very. The men, not so much, but rich traders nevertheless and they back the witness reports. I don't think it will amount to anything, but be ready for some letters and questions from the parties involved. Maybe even a visit. Official or not, I can't say." The count sounded mildly annoyed at the later part of his own statement.

"Alamo was a good boy, always was. One of Pete's and Helga's best pups. Too bad we weren't able to breed him before we sold him to the monks, but I think we can finally settle on a name for the dogs."

The count sat back sipping his drink and raised an eyebrow. "So we can finally stop calling them Duncan's Dogs?"

Duncan nodded.

Conrad raised an eyebrow in disbelief.

"Are you familiar with the story of the Alamo, Sir? No? Then let's watch the movie, it's one of my favorites. Even though the Spanish—well, Mexicans—win the fight, they lose the war."

"Read the letter closer, Herr Cunningham. The monks found three dogs of similar breeding from the mountains and Alamo was one of the ones they used to breed to them before they moved south towards the Rhine. His lineage isn't lost. They are also being very diligent in keeping up the log books and maintaining your factors for breeding. They still have the rest of the dogs you sold them."

Duncan nodded, showing he was listening to the count and reached into the cabinet and found the well used tape.

"Sophia, do we have any peanut brittle or popcorn for our guests?" They didn't, but trays of small sandwiches and snacks appeared as if by magic. How did his wife do it?

Not one of the dogs in the rooms begged. The ones that stayed in the house now were well trained in manners. Sophia saw to that. Old Pete still got tidbits from Duncan at meal times when she wasn't looking. Duncan suspected she knew, anyway.

As Sophia settled on Duncan's lap, she slipped him a defrosted pre-measured hypodermic from the freezer and let him inject himself. The larger glass injector and brass needles hurt like hell, but Duncan was used to it by now. Her body hid his actions and his grimace of pain from their guests.

"What's the name you've settled on, my husband?"

"Saint Alamo, the always faithful. If the Vatican won't do it, I can. His ancestors were half-saints in a way, too." Duncan tried to smile at his attempt at levity. "Can you translate that to Latin, hun?" Duncan rubbed Old Pete's ears—he wasn't going to cry.

"That's a mouthful," she said. "I've always liked Duncan's Dogs, myself."

Sophia took the hypodermic and placed it in the disinfectant the doctors had provided. She noted the time, amount

injected, last meal eaten and Duncan's activity level for the day into the ledger.

She returned after putting Duncan Junior to bed, settled down next to Duncan and placed his hand on her swelling belly. He whispered something in her ear and nibbled it. Sophia stifled a giggle. They did have important company.

"What are we going to do with our new lands, husband? All old farmlands and woods, and almost no people. And how much do you think is in the box?" She continued to whisper, still the merchant.

"It doesn't matter how much is in there. I'm a rich man right now. I have everything I need. I have a growing family," Duncan put his hand on Sophia's belly again, "and more friends than I know what to do with. We'll figure something out. By the way, you should remember to thank the count later.

"As for the lands? It's wartime. There might be some who want to settle amongst the refugees passing through the area. Part of it will remain a permanent training facility for the dogs and a central area for Conrad's patrols to stop over.

"New Petesburg will rebuild itself in no time. That's not even counting what we'll make from Three M this next quarter. The reward in the chest is just icing on the cake. We'll do just fine."

Old Pete pushed his way through the crowded room and settled at Duncan's feet as was his right.

Soon everyone was entranced by the movie. Sophia's eyes still drifted often to the small heavy chest on the nearby table.

October 1634, Cunningham household's driveway

"Herr Cunningham, why do some folks call you Slam Dunk?"

Duncan had been sitting at the edge of his driveway watching some of the neighborhood kids play ball and teaching them the finer points of teamwork.

The new insulin was working wonders. The only problems were occasional infections at the site of the shot. Mostly due from his rubbing the wounds that the big needles made. He'd learned early on to vary the injection's locations to minimize the bruising and subsequent problems.

Sophia religiously followed the cleaning requirements before she let him reuse a needle. Duncan swore to invest more money in the development of smaller needles. Each day it took longer for the bruises to fade.

"It's because when I was just a bit older than you, and not much taller, I could take that ball there in one hand and stuff it into the basket anytime I wanted to.

"That move's called a slam dunk. Not many white boys in West Virginia could do it back then. I was one of the first and so I got the nickname. That, and I used to shove people I didn't like into trash baskets." Duncan chuckled as picked up the questioner and held him over a trashcan, finally releasing the boy safely when he began to kick in earnest.

"No way! You're not putting me in there!"

"We believe the trash basket part, but not the basketball part. No way you could do that. No one can jump that high!"

"Is that a challenge?" Duncan checked his watch. He still had time before his next shot and snack break, but he'd been exercising all morning here at home with the neighborhood kids after discovering three old basketballs in the garage. Duncan had brought them out to the kids hanging around to play with. Strangely enough, he wasn't thirsty, even though he'd played a few games already.

Old Pete nudged him and whined. Duncan rubbed his head. "It's okay, Old Boy. This is an easy thing." In fact, he'd done it twice in a row after Duncan Junior's birth.

"Yeah!" the boys chorused.

"Okay. I make the basket and you all not only sweep my porches and driveway after we're done playing, but you come back over to my house this weekend and clean out the dog houses."

An unexpected week's worth of an Indian summer was nothing to waste. Hence his playing ball with the kids on the street. Maybe he and Sophia would go to New Petesburg to see how things were progressing, with the dogs and other projects this weekend.

Duncan stretched out and took a few experimental shots from around the yard. More to build up anticipation than to screw up his courage.

"I get three tries, right?"

"No!" "Nein!" The kids yelled in unison. They hated cleaning the dog pens even though they weren't as full as they used to be.

"Okay, watch this." Duncan began to dribble the ball and spun around Old Pete who seemed to want to stop him for some reason. Maybe he was jealous and wanted the ball but giving Old Pete the ball would spell its doom in one bite. He spun around Old Pete one more time to show off and switched the dribble twice and began the long, loping strides to the basket.

Duncan could hear the crowds screaming as he dribbled the ball from the half court painted onto his driveway. Suddenly he was in the gym of his youth and the heat grew close and he saw the flickers of colors through his one good eye, but all he saw were the phantoms of players he hadn't faced in nearly forty-five years. The flash of the green and white pompoms. The shapely legs of the cheerleaders.

Ghosts of his past glory. A dog barked, far away. He heard the chants counting down the game clock. He spun around, the ball bouncing around behind his back and into his left hand. He took a step and then palmed the ball in his right hand and leaped.

He rose towards the rim and his hand tomahawked the ball down inside it. He felt the crowd explode somewhere just behind his eyes. He heard the iron rim clang in protest to the abuse and the sound echoed and echoed and echoed.

"Slam Dunk" Cunningham never felt himself hit the driveway.

"Told yah I could still do it," he whispered.

Then the pain hit.

One of the older kids spoke up first. "Oh shit. Someone call 911 and fast."

To their credit, the boys didn't panic and began CPR immediately.

* * *

"There's nothing I can do for him." The massive dose of aspirin and painkillers she'd administered hadn't worked, but it was all she had to work with. Duncan had been overweight far too long even though he'd hit her demanded weight earlier last year. "I'm truly sorry, Mrs. Cunningham . . . Sophia." Dr. Shipley put her gear back into her bag, just to keep her hands busy.

"I'm fairly sure he's had a major stroke and a heart attack at the same time. Nothing a checkup would have shown coming, either. He just went too long without proper medications, is all. I'm afraid you don't have much time. I've made him as comfortable as I can, but you should go to him now." Susannah gathered her gear and did her best to make herself part of the furniture and disappear into the kitchen as people began to move back to the room where Duncan rested. She leaned against a wall trying to think of anything she could do to save him.

He had woken up twice while she did what she could, but the next time he closed his eyes would likely be his last. Dr. Shipley wanted to say something else about the baby the woman was still carrying, but words failed her. She'd already called Doctor McDonnell.

She didn't resist when someone pressed a jar of warm hard cider into her hand and she finally sat down in the kitchen and cried. She had a few patients she'd never really liked, and Duncan had been one of them. But he'd changed her mind with his accomplishments and attitude over the past year.

Duncan Cunningham had been a major, if not silent, contributor to the research and medications being produced for the local doctors and the hospitals through Three M. Giving some of her patients normal lives again.

That included the new insulin and other drugs that filled her freezers at work. *Normal lives again. . . .*

Dr. Shipley heard a patrol car pull up and its sirens die. That would be someone bringing in the rest of the family. She stood up and peeked into the bedroom. She couldn't face them all right now. One of the large pups came into the kitchen and laid its head into her lap and whined, when she finally sat down again.

She sneezed, but didn't shoo it away even though she was allergic to dogs.

"You're all loyal to your master, aren't you?" She scratched the pup's ears. Old Pete had refused to leave Duncan's bedside when she'd arrived and had only let in family and friends. It wouldn't be much longer, she knew. *Did I do everything I could?* she asked herself again and again.

Doctor McDonnell arrived an hour later and told her to go on home and that he'd take care of the paperwork. He knew the family better too, having dealt with them through Three M and the Manning Assisted Living Care Facility.

When young Noah's wailing started from the back of the house, she got up and began the long walk home instead of asking someone for a ride. No one objected when the puppy followed her home.

Old Pete didn't attend the funeral. He just sat guard by the crib, as if waiting for Duncan Junior to grow up so they could play. As the boy grew up, there would be plenty of new boots to chew on, too.

Grantville, October 1635

Sophia Cunningham petitioned and got their family crest approved a year later on the anniversary of Duncan's death. The motto over the new family mausoleum read translated from Latin. *Short are our lives, but like St Alamo's—always will we be faithful to the end.*

No matter the official name the dogs had been given for the history books and breeding papers, ever after in Grantville the dogs were always referred to as Duncan's Dogs.

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Sonata, Part One

Written by David Carrico



Movement I - Allegro con brio
From the Grantville News, Monday, January 2, 1634
Linder-Sylwester Wedding

The New Year began with more celebration than usual yesterday as Marla Linder and Franz Sylwester were united in marriage at 3 p.m. in the Methodist church. The bride wore a white gown in the old Grantville tradition, while the groom was dressed in a blue velvet jacket and black velvet trousers. The matron of honor was Anna Riebeck and the best man was Friedrich Braun. Other attendants were the bride's sister Jonni Chieske and Thomas Schwarzberg. The Reverend Simon Jones led the bride and groom in their vows and joined them in holy matrimony. A reception was held in the church's fellowship hall afterward. When asked why they selected Sunday as their wedding day, Marla replied that they wanted to begin the New Year as husband and wife. Franz added that being united on the Lord's Day made it even more meaningful. The new family will make their home in Magdeburg, where they will both be involved in music and the arts.

Grantville - Thursday, January 5, 1634

Franz felt as if he were walking on clouds as he walked hand in hand with Marla up the steps to the High Street House. Of course, he had felt that way since Sunday, when he and Marla were wed. It had happened so quickly, he still felt somewhat dizzy. It was hard to remember that it was only three weeks ago that he had proposed to Marla on bended knee before a room full of the most influential people in the USE. She had been patiently waiting for him to do so for months, but in his stubbornness he would not do so until the rehabilitation of his crippled hand had progressed enough to let him play his violin in public again. Once he had determined to propose, he waited for the night of her concert and took advantage of the setting as she responded to the final applause. He had well and truly surprised her, which was part of his delight, but it had not taken her long

to overcome that surprise, pull him to his feet and—how did he hear someone describe it . . . oh, yes—"plant a lip lock" on him. The days after that night had been a whirlwind of activity, as Marla was obligated to return to Grantville as soon as possible after that to sing the premiere of Maestro Carissimi's lament for the death of Hans Richter, *Lament for a Fallen Eagle*. It was to be performed on December 26th, the feast day of St. Stephen the Martyr. Somehow Franz was not surprised at the timing. The maestro, quiet though he was, had impressed him as being a man of thought and order. So, Marla, Franz and their friends—including Klaus and Reuel, who had been assigned to bodyguard duty by Gunther Achterhof after the episode in *The Green Horse* when Marla had been accosted by a drunk—had packed up on December 16th, the day after the concert, and left for Grantville. Klaus and Reuel were theoretically serving as couriers, and indeed, they did carry a package of papers to the CoC in Grantville. Everyone knew, however, that they were charged with Marla's safety.

The trip, although somewhat more taxing than when they traveled to Magdeburg on a barge, was somewhat more pleasant because of one thing: it was not raining. Marla did not handle being wet and cold very well. Franz sent silent prayers of thanks upwards for every day that dawned sunny and dry.

Once they arrived, the days prior to Christmas were filled with rehearsals at St. Mary's Catholic Church, the venue the maestro had chosen for the performance. Franz had sat on a pew, listening, as Marla, Isaac, Josef, Rudolf and Hermann had practiced with the composer and his chosen pianist, Elizabeth Jordan, one of Marla's former teachers. Frau Jordan had become a mentor to the renowned Italian composer in the ways of the music brought back in Grantville by the Ring of Fire, and it was a natural choice for her to play since Marla had been asked to sing the solo. Franz was still unable to play anything very complex yet, and had chosen to not attempt a part in this, desiring only the best performance for both Marla's sake and that of the maestro he had come to admire.

Christmas happened; a most joyful time in Grantville. The day after Christmas was the performance of the lament, and Marla had done as well as he had expected. Then she sprang her surprise on him. Even now, he remembered feeling as if he had been punched when she turned to him the morning of December 27th and said, "Let's get married! Now! We're here, my family and friends are here, and so are yours. Let's do it! On New Year's Day!" And he had been helpless to do anything except agree.

Once again, he saw Marla "kick into high gear." Once again all he could do was cling to her train as she, her aunt and her sister huddled together and planned a whirlwind campaign. They divided the tasks and moved out to conquer far faster than any military staff. Aunt Susan retired to the kitchen to do the baking for the reception. Jonni took over the arrangements with the church and the minister, the publication notice and preparation and circulation of invitations. Marla herself dealt with the question of attire.

A phone call to Karen Reading produced a squawk of "What?" Franz had heard it across the room from the phone. Karen had followed it with a stern command for Marla to get her behind to the Bridal Shop with no dilly-dallying around. Marla had obeyed that command. Franz traveled in her wake, to sit in a chair while Karen and Donna Lynn Rogers had fussed and fretted enough for three weddings while Marla tried on several dresses.

There were extended conversations about the suitability of each design, filled with arcane words that Franz had never heard before. For all he knew, they were conjuring up the desired dress. Fortunately, he had with him the book that Marcus Wendell, the band director, had given him, and he spent his time poring over that, looking up from time to time when one of the ladies would ask, "Franz, what do you think?" Each time he would smile and respond, "It looks beautiful to me."

When they (finally) had been allowed to leave toward the end of the day, Marla squeezed his arm as they walked out the door, and said, "Poor Franz, captive all day in a dress shop. You didn't have a clue what was going on, but your being there made me happy. Thank you." She leaned over and kissed him lightly.

The day of the wedding was mostly a blur, but he did have a few very clear memories. Marla smiling at him almost always warmed him to the point of fever, but that day, as he watched her walk down the aisle, the light in her eyes and the aura around her face took him to the point of incandescence. That peaked when she joined her hand to his and they walked up the steps to the platform and faced the minister.

That memory was playing in his mind as they stepped onto the porch of the mansion. Franz moved to one side, gathered Marla in his arms and proceeded to "plant a lip lock" of his own.

A timeless moment later they separated. Marla smiled at him. "Goodness! What was that for?"

Franz reached up to brush her hair back behind her ears as she continued to look at him quizzically. One of the many reasons he loved Marla was that she had never flinched from his crippled left hand. Truth to tell, when they walked hand in hand, she preferred to hold that one. "I love you," he said. Her smile widened, and she flowed back into his arms.

Another timeless moment passed. "You know," Marla murmured, caressing his cheek, "if you keep this up we'll be late for the meeting."

Franz captured her fingers and kissed them. "I know. If it wasn't so important to both of us, I wouldn't mind being very late." Marla broke away from him and slapped his bicep. "You! Get in there." He sighed, opened the front door, and followed her in. Every Grantville native called the stately old home that had been taken over by the city for administrative functions the High Street House. It was the closest thing to a mansion in Grantville. Franz and Marla walked into the meeting/event room at the back of the house and were greeted by applause. The ornate mahogany table had been moved from the former dining room. Many of the equally ornate chairs were occupied by friends and acquaintances who were clapping and whistling. Franz grinned, He could see Marla blushing.

Mary Simpson was seated at the head of the table, which didn't surprise Franz at all. She waved them to seats next to hers on the far side of the table as the noise died down. "Thank you all for coming today. I appreciate all of you taking the time for this meeting out of your busy schedules, or in the case of Marla and Franz, out of their honeymoon." Again there was applause from around the table. Marla blushed even more, and Franz's grin just got wider. "Nonetheless," Mary said, "I have to leave for Magdeburg shortly, and I really needed to talk to all of you about something that has got to be developed soon: an orchestra." Ears perked up all around the table. Franz looked over at Isaac Fremdling, then to Josef Tuchman, to see wide smiles on the faces of his fellow string players. Rudolf Tuchman, Josef's brother, snorted, and said, "Finally."

Mary smiled. "Yes. Finally. But we had to walk first, before we could run. The work that you did all last year . . ." Mary waved her hand to encompass everyone at the table, ". . . all of you, has laid the foundation for the work that will be done this year." "Umm, excuse me," said the quiet man dressed in a black cassock. "I think, perhaps, it would more correct be to say that the ground has been cleared for laying a foundation." The lilt of his voice made it very clear that not only was English not his first language, neither was German.

"You are right, Maestro Carissimi." Mary nodded, accepting the correction. "I spoke out of enthusiasm, but you are indeed right. What you collectively did last year was assemble the workmen and the tools that are needed to lay the foundation. Now we must begin that work."

Franz looked around the table as Mary spoke. It was quite an assemblage of musicians and craftsmen in this one room . . . perhaps the most impressive collection of adepts that he had ever had the good fortune to be part of. To Mary's left was Marcus Wendell, the Grantville High School band director. He was a man with an incredible mass of up-time musical knowledge in his mind. To his left were the Italian contingent, Maestro Giacomo Carissimi and his musician and crafter friends and associates. Beyond the Italians sat the representatives of Bledsoe and Riebeck, the Grantville/German instrument crafters. At the far end of the table, opposite of Mary, was Bitty Matowski, the ballet mistress, fresh from the triumph of her staging of *The Nutcracker*. Franz noticed that Bitty was the only person in the room who was smaller than Mary. To Mary's right were Marla, Franz, and all the men who had been part of the study group that had formed around Marla in the spring and summer of 1633.

Mary smiled again. "I am not a musician, but I have worked in supporting musical groups in the past. I can assure you that I have received commitments for financial support for an orchestra for the foreseeable future. However, if we want to realize those commitments, that orchestra must be produced, and soon. I believe that all of you in this room can contribute to that effort in some way. So, let's get started."

The next hour was a revelation to Franz. Mary directed the discussion as surely as Marcus Wendell directed the high school band. They moved smoothly from topic to topic, covering the various issues involved with reproducing the up-time instruments in their current circumstances. Franz watched with interest as Mary stopped incipient arguments, prompted people into revealing information they didn't realize was important, and kept them focused on the goal, all the while making copious notes in a notebook. He found the time educational, to say the least; as much about how to manage a conference as about the information that was being shared.



At the end of the discussion, Mary looked around the room. "Right. To summarize, both Ingram Bledsoe and Marcus Wendell believe that a number of usable instruments can probably be found in basements and attics in Grantville. Ingram will take charge of locating and acquiring those." She waved at the crafters on her left. "You gentlemen will work together to develop the techniques to reproduce uptime strings. Friedrich Braun will also collaborate with Leopold Gruenwald on duplicating the woodwinds. Leopold has already made good progress on duplicating the valves and slides for brass. Marcus believes duplicating the percussion instruments will not be a serious challenge as soon we can locate down-time drum crafters. So, did I leave anything out?"

"The wood," prompted Marcus.

Mary circled a note on the page in front of her. "Sorry, I do have that down. We need to get our merchant connections searching in Central and South America for pernambuco for bows and rosewood for xylophones and marimbas."

Mary turned a page in her notebook. "All right. We can probably locate enough wind instruments to begin an orchestra, and with some time and resources we can produce more. But instruments are useless without musicians to play them." She looked around the room. "We need more musicians. A lot more. And we need them relatively soon. With all due respect, Maestro Carissimi and Signore Abati and Zenti, they will probably have to be Germans. We don't have time to wait for messages to get to Italy and for others to follow your footsteps here."

Carissimi simply nodded. The others looked slightly mutinous but followed their countryman's lead and remained silent. Franz was wondering why Mary kept emphasizing a short time frame, when Marcus asked, "Why the short fuze, Mary?"

"I'll get to that in a moment. So, if we need good musicians, and we need them quickly, where can we find them?"

Franz looked down the table at his friends, and collected several nods. He looked back at Mary. "Some of them, at least, might come from Mainz. When the Prince-Bishop fled the sight of the Swedish army, he left his orchestra behind. That is where Isaac, Leopold, Thomas and I came from. There are others who can be encouraged to come, particularly if appropriate stipends are made available."

"Excellent! How many?"

Franz looked back at his fellows. "Twelve, maybe fifteen?"

Isaac nodded. "Unless they've all fled in the last few months, about that many."

Mary looked pensive. "That's not enough. Where can we find more?"

They all looked at each other, and a moment of silence ensued. Finally, Thomas asked, "Cannot some of your patrons provide some musicians?"

"As a last resort, they can," Mary responded, "but I would really rather not inconvenience them if we don't have to." Suddenly her eyes lit up, and an almost beatific smile appeared on her face. "What about the Elector of Saxony's orchestra? Can we

abscond with it like we will with the Prince-Bishop's?"

Shrugs all around the table. "It would be worth a try," said Isaac.

"Where else?"

Marla cleared her throat. "You might try sending circulars throughout Thuringia." Mary looked at her with a questioning expression. Marla continued. "According to the music history books, there should be at least a few Bachs scattered throughout this part of the country . . . ancestors and cousins of ancestors from collateral lines."

Mary grimaced, and made notes. "I knew that," she muttered.

"And according to Ed Piazza, there should be a sizable college of musicians around Stuttgart, as well," Marcus contributed.

Mary made more notes. Finally, she looked up again. "Okay, how do we get the word out?" The down-timers looked at her quizzically. She grinned. "How do we let musicians know that we're hiring, and what we have to offer?"

"I think," Maestro Carissimi offered, "that you will have to send personal representatives to most places. Here in Thuringia, perhaps broadsides would be useful, as most everyone does know of Grantville and what it means. But for places farther away, you must send ambassadors of music."

"Does anyone disagree?" Mary looked around the room. "Okay, we have Mainz, Stuttgart and Saxony. It will have to be you on this side of the table," she said, pointing to Franz. "The craftsmen, including Leopold, cannot leave. Thomas Schwarzberg as well. They must be focused on their work. So, who will go where?"

Franz looked over at Marla, who nodded in return. "We will go to Mainz."

Josef and Rudolf whispered back and forth for a moment. Josef said, "We will go to Stuttgart. We have a cousin there, who should provide us an opening."

Isaac had also been whispering with Hermann. He looked at Mary. "We will go to Saxony."

"Good." Mary wrote a few more notes in the ubiquitous notebook. She set the pen down, clasped her hands together in front of her, and gazed around the table. "Now, to answer Marcus' question from a few minutes ago, the reason I stressed short time lines is because our first concert has to be ready by the first of July."

"What?"

"*Gott in himmel!*"

Various exclamations echoed off the walls of the conference room, including at least two that Franz recognized as being Italian. From the frown that appeared on *Maestro* Carissimi's face, they must have been very vulgar.

Mary raised a hand to quiet them as Marcus interjected, "Mary, I don't know who you've made that commitment to, but you'd better try and get out of it, because, bluntly, it's not going to happen."

Mary's head turned and her eyes bored into his. "I beg your pardon? Did you not just tell me that there were plenty of instruments in the garages and attics, and that you could loan those we couldn't find? Did we not establish that the violins today are similar to the violins from up-time? If we can get the musicians quickly, what prevents us from getting the orchestra together and performing in six months?"

"Did you ever play a musical instrument, Mary?"

"I took piano lessons as a child."

Marcus chuckled. "About what I figured. Mary, I'm not concerned about the string players. In fact, I misspoke slightly. You can have a Bach era orchestra ready in six months or less. Bach, Handel, maybe early Haydn and Mozart, they could play. But late Classical era and later would be beyond them."

"Why?" Mary frowned. "Make me understand, Marcus."

"It's the wind players, Mary. All of these instruments we've been talking about—the woodwinds with the Böhm keys, and the brass with the valves and different styled mouthpieces. For these players, it will be almost like learning new instruments, and for clarinet and saxophone players that would be literally true.

"Mary, I've been teaching band for almost as long as Marla has been alive. And I worked with good musicians in college. I've seen musicians pick up a new instrument—one that's different from their primary—and try to learn it, and it takes a lot of time. I'll spare you the lengthy explanation with all the technical musical terms. It boils down to just the sheer physical drill of practicing, over and over and over until your lips are puffy and sore, your fingers are blistered and you are so sick of the instrument you want to throw it in the river, until you build muscle memory and it finally becomes second nature to you."

Marla smiled and nodded. Mary caught the motion, and it obviously added to the weight of what Marcus was saying.

"Okay, then, how long until we have a Beethoven or Rossini era orchestra?"



"From the time you hand them the instruments to the time they might—I say *might*—be ready to tackle that music, ten to twelve months. Might be more, but it would take a divine miracle for it to be much less. An individual player, maybe less, but a full ensemble, nope."

Mary frowned down at her hands tightly clasped on top of her notebook. She said in a low tone, "If that's what it will take, then that's what it will take. But we *will* perform a concert of at least some up-time music in early July, even if it's nothing but Bach and Handel. And, yes, Bitty, I still want a season of ballet this year. Some kind of accompaniment will be available." She raised her head and stared each of them in the eyes in turn. When his turn came, Franz felt as if he were staring down the barrels of a pair of matched dueling pistols. He had never seen her gray eyes seem that cold before. Taking a deep breath, he nodded in return, and everyone in the room echoed him.

"Good." Mary closed her notebook. "I will be leaving for Magdeburg in another day or so. I may speak to a few of you before I leave. For now, after I leave you can contact Lady Beth Haygood. You will be able to communicate with me through her, and she will coordinate finances, including traveling expenses for those of you who will be traveling." She stood. "Thank you all for your time today, for the hard work you've already done, and for your commitment to the work yet to be done. I truly do appreciate it." She looked around the room, this time with a warm smile on her face, and everyone's spirits lightened a little before she swept out of the room. The Italians and most of the instrument crafters followed close behind her.

The energy level in the room dropped dramatically after Mary left. Once again Franz was reminded of just how intense Mrs. Simpson could be. Someone at the other end of the table gave a low whistle. Marcus chuckled. "I do believe we've been drafted into the USE Arts League, folks."

"I was reading in the Bible yesterday, in the Book of Judges," Isaac said. "I believe I now know how Barak must have felt when Deborah summoned him." Everyone laughed.

Marla smiled. "Well, that's better than Elijah before Jezebel. All we have to do is raise an orchestra out of the fertile ground of Thuringia." The laughter was louder this time.

"At least your assignment is possible." They all looked at the end of the table where Bitty Matowski had almost huddled in her chair for the entire meeting. "She wants me to stage *Swan Lake* in six months, and I can't do it, not here, not now!" Franz was a

little taken aback by the vehemence in her voice. "The only reason I came to this meeting was to find out if an orchestra will be available in July."

Marcus and Franz both started to speak, but Franz gestured to Marcus to continue. "Bitty, there will be an orchestra then. Will it be able to perform Tchaikovsky? I doubt it, but I'm not going to rule the possibility out. If Franz and his friends can play the music, can you stage the dance?"

"No," Bitty said in a low tone of voice. "At least not anything like what Her Ladyship and her friends would be expecting. The big set pieces she expects for the second and fourth acts require more than two dozen *en pointe* dancers, and I'm lucky if I have ten. I won't allow any of my students to perform *en pointe* until I believe they are ready. Not a moment earlier. Not for anyone or anything will I risk ruining their feet. And if Her Ladyship doesn't like that she can . . ."

"Bitty," Marla interrupted. "Calm down." Bitty settled back in her chair, giving a jerky nod in return.

Franz was astounded to hear Mary Simpson spoken of in the tone used by Bitty. Evidently not everyone viewed her intensity and drive as well as he did.

"Now, do you know for sure you can't do *Swan Lake*?" Marla asked.

"No. She told me last Friday, after the last performance. I've been stewing about it ever since, but I haven't talked to the dancers yet, because I didn't want to ruin their holiday."

"Well, then," Marla said, "get them together. Talk to them. See if together you can think of a way to do it. If you can't, come up with an alternate proposal and present it to Mary."

"But what about music, and lighting, and . . ."

Marla raised a hand, and Bitty stopped in mid-sentence. "How many times while I was taking dance from you did I hear you say that you can't write staging directions and cues until you know what you're going to do and where you're going to do it? Figure out what you're going to do and tell Mary, then find out where it's going to be done. *Then* you can worry about the other stuff."

Marcus cleared his throat. "When you know what you want to do, Bitty, come talk to me so we can look at music. Whatever you end up using musically, there's a pretty good chance that Thomas will have to transcribe it. That will take some time, so he needs to know as soon as possible. That goes for you, too . . ." Marcus looked across the table at Franz. "Once you decide what will be performed, get the word to Thomas as soon as you can. If she wants a concert in July, you'd best start rehearsing in April. And no, before you ask, I can't help."

Bitty still looked unhappy, but she nodded. "Thanks, Marcus, Marla."

Marcus placed his palms on the table and pushed himself upright. "Well, folks, I believe we've all got work to do." He led the way out of the conference room and down the short hall to the front door.

Outside, Marla gave Bitty a quick hug and some more encouragement, then joined the huddle of friends around Franz. He looked at them all. "Well, what are we going to do?"

They looked at each other. Glances went around the circle several times, and finally Thomas rumbled in his deep voice, "You have the best sense for the music, Franz. You choose the works, and I will make sure they are ready by April."

Franz looked around the circle again. "Is that what you all want?" Nods from them all, including Marla. He sighed. "So be it."

Grantville - Friday morning, January 6, 1634

Marla kissed Franz. "I'm off to the school. I'll meet you in the band room at last hour, right?" Franz nodded, and she turned away to walk down the street, headed for her appointment to play and sing for some of the elementary classes as a treat.

For a moment, Franz was a little disoriented. This was the first time since the wedding that they had been separated for more than a few minutes, but today he had no desire to mingle with a mob of young children. It did feel a little odd, though, not having Marla beside him as he wandered up the street.

The day was sunny and clear, the air was brisk and cold, but not to the point where it hurt to breathe. The joy that had been bubbling inside of him for the last three weeks overflowed, and he flung his arms wide and twirled on the sidewalk, laughing freely. As he came full circle, he was face to face with one of the elderly ladies who lived nearby. She was on her way to do some shopping with the net bag hanging from her arm next to her purse. Her eyes were wide, but she offered him a timorous smile when he stepped off the sidewalk, bowed and, with flamboyance worthy of Signor Abati, gestured that she should continue.

He was still grinning from ear to ear when he entered the workshop of Bledsoe and Riebeck. Not only was his friend, Friedrich and his craft master Hans, present, but also their competitors, Signor Girolamo Zenti and Johannes Fichtold, his associate journeyman. Of the major wood craftsmen at yesterday's meeting, only Ingram Bledsoe was missing. The four were grouped

around a work table, looking at the pieces of a violin in the process of assembly and discussing it animatedly. Friedrich looked up and spotted him.

"Franz! What are you doing here, and where is Marla?"

"She is visiting school classrooms this morning to entertain children, so I thought I would do something similar and come see what happens here."

Friedrich laughed, and Master Hans had a smile nestling in his gray beard. Their two visitors were a little taken aback by the banter, but quickly sprouted smiles of their own.

"*Ach*, Franz, I see that marriage has not stopped your foolishness," Master Hans said.

"And if you thought it would, good master, then you expected too much. I am as great a fool as ever." Franz laughed. "The giddiest of fools, indeed. I rouse with the sun each day in joy, and lay my head down at night in bliss. 'Twixt the two I wander and run in delight. A fool I am indeed." He held a finger up and winked. "But surely the wisest of fools for wedding Marla. Let it be carved on my tombstone at the end of a hopefully long life, that I had wisdom enough to marry the good Marla Linder."

Now they all started laughing, and crowded around Franz to shake his hand and clap his shoulders once more in congratulations. As they started to settle down, Master Hans assumed a serious expression. "You know, young Franz, that it will not always be thus. The first bloom will fade, and only if you have sunk deep roots will you survive."

Franz sobered. "Aye, Master Hans. We know enough of life to know that our roots must run deep and twine together for there to be blooms and fruit throughout our lives. Marla will challenge me to my best, but a burden that will never be, as I want for her nothing but the best. We have each other, and we have God. It will be enough."

The others nodded, with a muttered, "So let it be," from Friedrich.

There was a moment of silence, then Franz gestured to the bench. "Enough of me. What happens here?"

"I had some time ago," Friedrich stepped toward the bench, "begun trying to fashion a violin after the model of one belonging to Master Ingram, one he said belonged to an uncle before it came to him. Maple for the back," pointing to the elements, "spruce for the top, somewhat wider than your own, sound holes cut as so. Resonator bar here, sound post ready to join front and back. Longer neck, joined to the body at a steeper angle.

"One innovation that I had not seen before: the finger board on the neck is slanted slightly from side to side. I had to think on it for some while before I realized that it provided an equal distance for each string to be pressed down to the board. You had told me before of the increase of violin art, of the rise of virtuosi, and I heard music last summer. But this brought it home to me, that the virtuoso's technique would be so demanding that a flat neck would produce irregularities in playing rapidly because of the differing widths of the strings. It makes sense, once I understand it, as does the longer neck. The longer the neck, the more notes you can play on it. This is a design with years, even centuries, more breeding behind it than the one I made you. This is a merino, while the one I made in Mainz for you is perhaps not a Brillo, but is not far from it."

"So I am a shepherd now, am I?" Franz laughed along with the others at the reference to the famous—and infamous—ram.

"Aye, a shepherd of music," Friedrich replied, "perhaps one of the great ones."

"Pfaugh! You flatter me."

"No, my friend, no. It is but truth. You found Grantville's music first, even before Maestro Carissimi." Friedrich nodded to Master Girolamo. "You called us here, you drove us to follow Marla, chivvying us along, all the while wondering if you would ever play again. And by the grace of God and your own endurance you have begun to play. The others follow your lead, and well they should. You will lead them to glory, a musical Alexander, and they will be known as your companions. They all sense this, even Hermann of the hard head."

Franz stared at his friend in amazement. Never had he heard such come from Friedrich before. "Are you the modern Delphian Oracle, then?"

Looking a bit abashed, Friedrich replied, "Nay, no prophet or seer, I. The future is hidden from me in fog and clouds of gun smoke, just as it is to everyone. But this much is plain to me."

"Heavy expectations you lay upon me," Franz said.

"No heavier than what you lay upon yourself."

"I will say this," interjected Master Girolamo. "I have heard Maestro Carissimi say that Signora Marla's flame burns bright, but yours burns hotter." Johannes nodded in agreement.

Franz stared at them all, all of them returning his stare with level gazes. "I . . . I do not know what to make of this. I . . . I am not accustomed to thinking of myself as such."

Master Hans stepped to him and laid a hand on his shoulder. "Think not about it. Just be yourself, the wise fool Franz who

loves Frau Marla Linder and loves music. Be true to that, and let whatever else come that will."

Franz looked him in the eye for a moment, then nodded slowly. "That I can do. That I will."

"Good." The master clapped his shoulder again with a blow that staggered him. "Now, let us consider again this merino of violins." They all shook themselves, laughing together, and grouped around the table again.

"So, you have determined the instrument's physique," Franz said. Master Zenti grunted, the others nodded. "And how long to make one, then?"

"I say three months or more," from Friedrich, "but Johannes there says that his kinsmen and fellow craftsmen in Füssen can produce one in two."

"Ah, you are from Füssen, then?" Franz turned to Johannes. "I have heard of their violins, I believe. Are you then a crafter of such?"



Johannes shook his head. "No. I agreed to come with Master Girolamo, and I am assisting in his work with pianos, but my family are *luthiers* . . . *geigenfabrikants*. Our specialty is lutes, but I have helped with violins before. Four, maybe five violins."

"Füssen has fine woods, fine timber," Master Girolamo added. "I have ordered woods from there to be sent to me here. But obviously the Füssen craftsmen would get first choice."

"So, two months. Allowing for time to get to Füssen, and time for the violins to return, if we desired to order from everyone in Füssen who could build this 'merino' violin design, including the new bows as well," Franz said slowly, working through an idea, "how many could we have by, say . . . the end of April?"

Johannes pondered that question, lips moving and fingers counting on fingers. Finally he looked up. "If they can be convinced to make these the most important works, put them ahead of their other contracts, I would think twenty, perhaps twenty-five."

Franz looked at the two masters. "If Ingram has any fortune at all in finding sound and playable up-time violins in basements and attics, that would surely equip the violinists of our orchestra soon to be hatched." They accepted his statement as fact, and both looked back at him with identical quizzical expressions on their faces. "So, you send Johannes to Füssen with the 'merino' design, authority to contract and enough silver to bind the contracts. Get them started soon. Neither of you can produce what is required as soon as they can."

"True," Master Hans said sourly, and Master Girolamo grunted in agreement.

"It will cost," warned Johannes. "You will pay for the new design, you will pay for the speed, and you will definitely pay to put your order at the head of their ladders."

"I believe that Frau Simpson understands the concept of paying to expedite. Make your guess as to what is needed, and talk to this Lady Beth Haygood that Frau Simpson said will be her voice and hand. Get lots of silver, or drafts on the Abrabanel may be even better. Best send a couple of guards with Johannes, as well." Franz started to turn back to the table, paused, and added, "And make it a provision of each contract that for two years they will only produce 'merino' design violins for the Magdeburg orchestra."

"Better if you make it five or six years," Master Girolamo's grin was evil, "and let them bargain you down to two in exchange for lower prices and first place on the work ladders."

"Listen well to that one." Master Hans matched grin with grin. "You youngsters have yet to learn that there is a time and a place for passion, and a time and a place for guile. Our Italian friend understands guile right well."

"As you advise, then," Franz said. "Just begin it quickly."

"Surely you will not gift these instruments to the players?" Friedrich asked. "I doubt that Frau Simpson would agree to that, regardless of how quickly she desires to see them provided."

"No," Franz responded. "The players will pay for them, will pay what we pay plus the cartage. If one has not sufficient silver, then a portion of his stipend will be withheld until the full sum is paid. Make sure that Frau Mary's voice and hand knows of this as well."

Turning back to the table, unaware of just how much he sounded like a general issuing commands, Franz said, "And do you have a 'merino' design for a viola . . ."

Grantville - Friday afternoon, January 6, 1634

Franz was surprised to see Maestro Giacomo Carissimi walking slowly ahead of him in the hallway of the high school. The gifted and well-known Italian composer had come to Grantville chasing the rumors of unique and remarkable music. He had found more than he had ever dreamed could exist.

In truth, Franz and his friends had come for the same reason as Maestro Carissimi. Franz had stumbled upon Grantville first, and had then summoned his friends and acquaintances from his erstwhile home of Mainz. Others had followed the rumors on their own—the brothers Josef and Rudolf Tuchman from Hannover and Hermann Katzberg from Hamburg. Because they had the advantage of shorter distances to travel, they were all in Grantville and soaking up musical knowledge like a sot guzzling wine weeks before the Italian had arrived. Franz had to admit that the maestro had made up for lost time since then. He was somewhat in awe of how quickly that quiet, soft-spoken, shy man had progressed to the place where he was beginning to write in new idioms.

Franz fell into step beside the Italian. "Good afternoon, Maestro."

The older man looked around at him with a shy smile. "Oh, it is you, Signor Franz. And a *buon pomeriggio*, or as you would say it, *guten Tag*. Shall we continue in German, or perhaps Latin?"

"No, maestro, no." Franz laughed, shifting his books to his other hand. "Let us continue to practice English."

"Hmm, a practice in which you have over me the advantage." The maestro looked faintly disappointed.

"But do not the physicians say that one must exercise weak muscles to strengthen them? So it is with languages, I have observed."

Carissimi laughed. "I must allow you the hit, young sir. Very well, let us together exercise. Perhaps my command of the English will improve, to the amazing of my English friend, Father Fitzherbert."

They were nearly to the double doors to the band room. Franz gestured to them. "Do you come here often? To the rehearsals, I mean?"

"Yes. Yes, I do, to steep myself in the sounds of these winds. We have nothing like them. They are so new, so different, so . . . challenging."

"Challenging?" Franz opened the door and allowed Carissimi to precede him.

"Yes. It is like a naturalist who goes to America, and finds there new kinds of animals. They may be beautiful, but he must study them to know what they live with, what they feed on, if they are of a temperament to be domesticated, to what work they can be put. So it is with these . . . I am the naturalist of music whose world has been turned . . . ah . . . *piedi sottosopra* . . ."

"Feet over head," a voice supplied from behind them. "We would say 'upside down.'" They turned to see Marla entering the room behind them.

Carissimi nodded. "Yes. Exactly so, upside down. And I must understand them before I can know to what use to put them. Good afternoon, Signora Marla. And let me say once again," with a slight bow, "*i miei piu' sentiti ringraziamenti* for the wonderful performing of my humble *lamento* done by you and your friends. I was at the end of my wit, *molto frustrato*, when I

was told no orchestra was in Grantville. To have your friends play was a blessing, and to have your voice to sing was a gift from God."

A faint blush painted Marla's cheeks. "Maestro, you are too kind, and surely you exaggerate. Signor Abati could have done it much better, I am sure."

"Mmm, forgive me the disagreeing, but no, child, he could not. I have known Andrea, *il Prosperino*, for some time, and known of him for longer. He might, perhaps, have sung it slightly more correctly . . ." Carissimi checked a little as Marla looked away from him. "Forgive me. If I offend I regret. But, child, despite what you might have thought, you are not the world's only great singer. Andrea, he has been singing for over twenty years. His voice, now it is prime. The best in Italy he is, which means the best in the world. And I, Giacomo Carissimi, I say that he might have sung my *lamento* with a slight more correctness, but he would never have sung it with your passion."

Franz was surprised at the conversation occurring in front of him. Always before *il maestro* had been very shy with women, almost ill at ease. Today he spoke to Marla as he would to a respected colleague.

The Italian sighed, and said quietly, "Andrea . . . It is often so with the great ones when they reach Olympus so young. They have nothing to live for but the hope that some great work will require them and only them before they fade. I think that is why Andrea took the offer of the place in the court of Brandenburg—to do a new something, to go to a new place, to do something no *castrato* before him had done. But now, now he has found Magdeburg, and Grantville, and the music you have that is nowhere else. Now, I think, he has found his calling, found the challenge that will face him every day for the rest of his life. In his own way, he has found heaven on earth."

Carissimi turned and looked directly into Marla's eyes, something that he did more now than earlier in their acquaintance. "And you, child, Marla, you with the golden gift from God of a voice, you should study with him. He can teach you much that you need, if you will ask him. It will enliven him, and will help you."

Marla nodded slowly. "I will follow your advice, Maestro."

"Good. You will the better be for it."

At that moment, the door to the band room flung open, and they all jumped as Marcus Wendell charged through. "Hah! You're all here. Good!" He plopped a stack of paper down on a stool, and faced Franz. "So, you ready to try, Franz?" With a gulp, Franz straightened and nodded. "Good. Bring your score, and let's look over it one last time . . ." The school bell rang for the change of classes, and Marcus grimaced. "Sorry, too late. Here they come."

And indeed, there was a rising thunder of footsteps in the hallway. Franz and his companions pressed back against the wall, out of the way, as a seemingly endless tide of young bodies flung itself through the doorway and crashed on the chairs arranged around the podium as a breaking wave on shore. Within a couple of minutes every chair was full, and students were chattering away as they fitted instrument pieces together. It was amazing how well twenty-five teenagers sucking on clarinet reeds could at the same time carry on conversations with at least three other players sitting near them. Reeds began to squeal and sound, brass began to blare and blat, drums began rolling, tubas began thundering. Just as the cacophony began to overpower them, the class bell rang again, and Marcus stepped up on the podium. Within moments, there was quiet.

Franz watched intently as Marcus prepared the band, running them through various tuning exercises. At length, he cut them off and set his baton on the stand. "Okay, kids, listen up." They looked at him expectantly, with a few sidelong glances at the guests by the door. They were used to Maestro Carissimi—Mister C, they called him sometimes—listening in on their rehearsals, but Franz and Marla were new faces to them, at least in Mr. Wendell's domain.

"You've got a new piece of music in your folders. Or it's new to some of you. I think we played it a couple of years ago, so most of you probably remember it. Anyway, pull it out, because Mr. Sylwester here is going to take the baton in a minute and direct it."

"Mr. Wendell," called a voice from the tuba section over the excited whispers.

"What?"

"You didn't say what piece it was."

Amid the smothered giggles and snickers from the other kids, Marcus smiled. "Okay, Dane, you got me that time. Get out *A Civil War Medley*."

Paper rustled all over the room as Marcus stepped from the podium and motioned Franz over. The older man offered the baton across his left forearm as if he were surrendering a sword. Franz accepted it with no small amount of trepidation. Leaning forward a little, Marcus murmured, "They're good kids, and they won't mess with you. Just give them a good downbeat and keep the patterns going, no matter what. Go straight through it one time, we'll compare notes quickly, then you can work with them some."

Mouth dry enough to resemble a desert, Franz nodded again. The podium looked about five feet tall in front of him, but he managed to raise a foot and step up on it. He placed his copy of the score on the music stand, and adjusted it to his height. Fussing with the score, he placed it just so, then slowly opened the cover to the first page of music. He knew he was avoiding looking at the band members, out of simple fear deferring the moment when he would have to begin. It was the thought of Marla behind him that caused Franz to straighten up, throw his shoulders back, and raise his head to look at the . . . musicians. They might be only children, teenagers, but they were musicians, and he owed them his best. They sat quietly, instruments on laps, waiting on him.

Franz raised his hands, baton gripped in his right, and poised at the top of their movement. Instruments were raised all over the room. "Four beats," he said, after the manner of Marcus. The tip of the baton moved through three slight beats and raised high. As he brought it down, the music began.

Focused as he was on just getting the pattern started, the crash of music startled Franz so that he almost lost control. Marcus had given him the book on conducting and the score to the piece right after they returned to Grantville. He had read the book from cover to cover, calling on Marla to translate where he wanted to make sure he understood. Each picture and diagram was scrutinized to the point that Marla had laughed that he was wearing the ink off of the pages. From her own experience as a student conductor for Marcus, she was able to guide him in developing the patterns and the common practices of conducting. And then he practiced . . . over and over and over he practiced, to the point he thought his arm was going to fall off. But during all of his practice, he was hearing the music in his head, which by its nature is a quiet exercise. To actually hear the music, to hear the crash of cymbals, the roll of the drums and the crisp sounds of the trumpets nearly blew him off of the podium.

The first song in the medley possessed the odd name of 'Marching Through Georgia.' It was a sprightly song, one that could have been played at a dance, Franz thought. His pattern was quick and brisk, in keeping with the *allegro* tempo marking. He managed to remember to turn the pages as those points were reached. The song passed quickly. Almost before he knew it the modulation to the second song was upon him.

Making his patterns broader and slower, he negotiated the change to 'When Johnny Comes Marching Home.' He was gratified that the students had slowed in keeping with his changes. The new tempo was *andante*, and his pattern was in accordance with that instruction. Again, looking around, he was pleased to see the students—no, the musicians—were intent on their music, somehow keeping one eye on the pages and one eye on him. He sped up the pattern just a little, and the ease with which they matched his change fed him such exhilaration that he almost laughed.

The second transition was upon him, and again Franz led the band through another modulation to 'The Battle Hymn of the Republic,' speeding the tempo up to match the *alla marcia* marking. This was his favorite of the three songs, and he poured himself into it. In the second verse, the *legato* rendition, he motioned to the clarinets to play softer, and they responded! In the third verse, the finale, he switched to a deliberate pattern. When the trumpets weren't strong enough to suit him, he forcefully beckoned to them to play louder. And they responded! Energized, he led them through the final chorus, slowing the tempo because of the *ritard*, to the great concluding series of chords alternating with cymbal crashes, to the final chord with its crescendo, held at length, and finally released with the final crash of cymbals.

Franz dropped his arms, dazed for a moment that it was ended. He looked over to where Marcus was standing against the wall, and saw him smiling, giving him the thumbs-up signal that in Grantville meant 'you done good.' Relaxing, he stepped down from the podium and met Marcus to hear his comments and suggestions.

* * *

During the conference, Carissimi leaned over to Marla. "This is one of the things I marvel at, this conductor. Never would it have occurred to me that there was a different way than having the continuo player, the harpsichordist, lead the performance. But to watch Master Wendell, and now Franz, I see a better way, a way for one man to be to an ensemble as a violinist is to the violin. Does it work that way? Does the skill and the talent of the conductor make as much difference to the orchestra or band as the skill and talent of the musicians?"

"Perhaps more so," Marla whispered back.

Carissimi sat back. "This bears thinking upon."

* * *

Franz stepped back up on the podium, noting in the back of his mind that what had seemed so high an obstacle less than a quarter-hour ago was now only a step. Keeping in mind the things that Marcus and he had discussed, he raised his hands to begin rehearsing the piece, the work of taking each section and hammering it until it was as near perfect as the musicians could produce.

At the end of the hour, after the final run-through of the piece, Franz reluctantly put the baton back down on the director's

stand, and faced the band once more. "Thank you. Thank you for letting me learn to be a conductor, a *dirigent* we will call it in German, to learn with you." Giving them a slight bow, he clapped to them and for them.

"Let's hear it for Mr. S," came the irrepressible voice from the tubas, and the students stood and clapped for Franz, with cheers and whistles from all over and a cymbal crash from the drums. His face felt flushed, and he stepped from the podium and gave them the full bow, the one he would give to an audience that applauded for him.

Just then the final bell rang, and the band dissolved into the bustle of putting away of music and instruments. Many of the students spoke to him as they left. Finally, the room was empty.

Marcus came over to shake hands with him. Franz tried to return the baton to him, but Marcus said, "Keep it, Franz. You'll need it, and I have another." Smiling, he waved to the others and left.

Cradling the baton, Franz slowly turned and walked over to Marla and Maestro Carissimi. Marla looked at his shining face, his gleaming eyes, the grin that threatened to split his face and the way he almost danced as he moved toward them. She smiled in return. "Well?"

Franz turned and looked at the empty chairs for a moment, drinking in the moment. When he faced them again, he said quietly, "It was as if I had the wings of Icarus, only, unlike Icarus, I reached the glory of the sun."

Grantville - Saturday morning, January 7, 1634

The door in front of Franz opened to reveal the face of his friend Thomas Schwarzberg. "'Come in, my friend, come in.'" Thomas gestured Franz to a chair on one side of his work table.. "And to what do I owe the honor of this visit?" He sat down on the chair on the other side.

"To this." Franz handed him a sheet of paper with a list on it. Thomas took it, and raised his eyebrows at the contents.

"I take it these are the works you want notated from CDs for Frau Mary's concert?"

"Aye. In addition to those five, I have asked Maestro Carissimi to provide something, as well. He said that he would try, but that it might not be very long."

"Hmm. J. S. Bach's *Concerto No. 3 in G Major*. Is that not one of the so-called '*Brandenburg Concerti*'?"

"Yes." Franz smiled. "But perhaps in this time that is not the most fortuitous of names. Shall we re-christen it, then?"

A slow smile crossed Thomas' face. "I like that thought, Franz. I must admit to liking it muchly. So, have you somewhat in mind to rename it?"

"Perhaps. In truth, one or two."

"And?"

"I thought first of naming it 'Magdeburg' after the city where it will first be played in our time." Franz quirked an eyebrow.

His friend nodded, pulling at his chin. "'Twould be a good fit, I think. Brandenburg, Magdeburg . . . it rolls off the tongue in much the same way. But what was the other?"

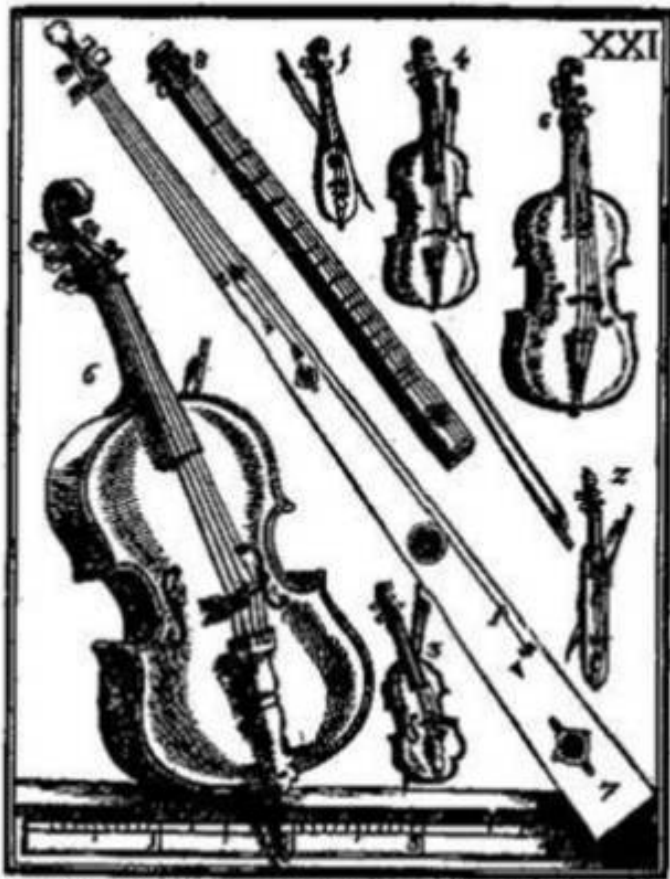
"Vasa."

Thomas' eyes opened wide, and his chin dropped. Franz enjoyed the look of amazement, before the laughter began. The deep bass voice of his friend resounded in the room, his hilarity echoing from the walls. Finally, it dwindled away to mere chuckles while he wiped his eyes.

"Oh, Franz. It is too good! Oh, the thought of that story becoming commonly known . . . how the concerti were named *Brandenburg* in the up-time, but that they will now be know as *Vasa* in honor of the great king. How that will twist in the bowels of Elector George William! Would that I could be a mouse in the chamber when he hears of it!" Off he went, laughing again, with Franz chuckling in spite of himself.

Wiping his eyes, Thomas picked up the list again. His voice was somewhat uneven when he said, "So are there any other delights like the first in the list?"

Franz shook his head. "No. The Pachelbel *Canon in D* and the Albinoni *Adagio* will be comfortable to the ears of the patrons. And when you do the *Adagio*, if you will, voice it for all strings; two choirs of strings if you must."



1. A. Stiller Pöförs / Öförs en Öster pipor. 2. Döförs-Öförs en Öster pipor.
4. Öster Döförs-Öförs. 3. Tröförs-Öförs. 6. Öförs-Öförs-bracke. 7. Österpipor.
8. Österpipor.

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Thomas nodded, and read down the list, humming a little. "Yes, yes, I remember the *Adagio* from Marla's teaching. Oh, my!" Thomas was looking at the last two works on the list. "You do believe in a challenge, my friend."

Franz smiled. "Can you think of two other 'modern' works that would speak to Frau Mary's patrons more than those?" Thomas slowly shook his head. "We will learn them. I will put the Barber work in the midst of the program, and the Vaughan Williams work at the end. And we will triumph, triumph indeed."

Cocking his head to one side, Thomas looked Franz in the eye for a long moment, then laid the list on the desk. "We named you to do this, so we will follow where you lead. 'Tis challenging, but challenge makes for excitement and interest. So, with these five and one from the maestro, you have six. Enough for a night's entertainment that Frau Mary can well be pleased by."

Franz reached inside his jacket. "And one more." He handed Thomas a piece of printed music. "This I have borrowed from the library of the choir of the Methodist church. I need the piano score voiced for strings, please, oh greatest of all scribblers."

Reading through the work, Thomas began to smile. "Oh, indeed. I see your intent. 'Twould be beautiful, indeed. Oh, yes."

Turning serious, Franz said, "Can you do this—all of it—by the first day of April?"

"Eleven, almost twelve weeks from now? Yes. With Master Wendell recently making known to me the printer who prints his blank staff pages so that I no longer have to draw my own staves, then yes, I can do it. Mind you, we will probably still be scribbling out some of the individual parts when the first rehearsal begins, but we have all done that before."

"I count on you, my friend." Franz buttoned up his jacket. "I leave for Mainz on Monday, so I leave this in your hands. Trusting you, I shall not worry."

"It will be done."

They clasped hands, then Franz was gone.

"Hmm," Thomas said. "I believe I shall need some more pencils."

Grantville - Saturday evening, January 7, 1634

Isaac Fremdling—after almost six years away from his people, it was how he thought of himself now—waited in the shadows of the back corner of the synagogue as everyone left after the service that concluded *Shabbat*. He stirred as the rabbi and the president walked up the room from the *Aron Kodesh*, the ark containing the holy scrolls, toward the doors. The *shamash*, or caretaker, was still on the *bima* platform, fussing about something. Isaac stopped in the doorway, and contemplated the *mezuzah*, with its precious text contained inside. *Shema, Yisroel, Adonai Elohenu, Adonai echod*. Across the years, he could still hear his father saying that to his congregation . . . *Hear, O Israel, The Lord Our God, The Lord is One*. Slowly, deliberately, Isaac kissed the fingertips of his right hand, firmly touched them to the *mezuzah*, and turned to leave.

"*Shavuah tov*, Reb Yitzhak." Startled at hearing his Hebrew name, Isaac turned to his right, facing a man walking toward him. The lamplight revealed him to be Don Francisco Nasi.

"And a good week to you, Reb Pinchas." Isaac immediately bowed toward the man who just might be the most important Jew in Europe—certainly the most influential—and in turn called him by his Hebrew name.

"Come, walk with me a while, of your kindness." Don Francisco linked his arm through Isaac's and guided him down the steps to the street. "It has been good to see you in the congregation these past few weeks. Have you found our Sephardic practices much different from those you grew up with?"

Mind reeling from the shock of having this man, a member of the famed Abrabanel family and the *mano sinistra*—the left hand—of Prime Minister Stearns, not just talking to him, but searching him out for a time of one-to-one conversation, Isaac mustered wits enough to say, "Some things are different, sir—the music is perhaps not as melodious, the Hebrew spoken is a little sharper—but the important things are the same."

"Hmm, yes, we can say something very like that about our history as God's Chosen People, can we not? Some things are different, some things change, but the important things remain the same."

"Yes, sir." Isaac's mind was spinning like a dreidel, slower now, settling, only to be sent flying again by his companion's next statement.

"Your family is doing well, in Aschenhausen." Isaac's jaw dropped. He stopped dead in the street and turned toward his companion.

"How . . . how . . ." Both his tongue and his mind were stuttering.

"Oh, come now," Don Francisco—he was so well known by that name that Isaac had trouble thinking of him by any other—smiled as he resumed walking, towing Isaac along beside him. "What kind of spy master would I be, Isaac Fremdling, Yitzhak ben Shlomo haLevi, if I could not find your name and your roots?" Isaac shook his head in bewilderment. "Your father is still rabbi of the congregation there. Your mother's hands hurt from the rheumatism more, but your sisters Devorah and Rachel are taking over more of the housework from her. Your younger brother Reuven is becoming quite a scholar, able to quote lengthy passages from *Torah* and *Nevi'im* by heart, and beginning to read the *Talmud*. There is talk of sending him someplace to study . . . perhaps to Rabbi Mordechai in Prague."

Isaac's heart sang within him. This was the first word he had had of his family since he had been disowned by his father over five years ago. They were all still alive! The girls must be big enough to be dreaming of marriage, and Reuven . . . why, Reuven must be almost thirteen now, preparing for his *bar mitzvah*! The old ache suddenly was made fresh again, stabbing to his core, eliciting a choked sob that he tried to muffle with his other hand. He was grateful when Don Francisco effected not to notice.

"I . . . thank you," he said finally. "That is . . . good news . . . indeed."

They walked together for a long moment. Finally Don Francisco spoke. "I know that the . . . manner . . . in which you left Aschenhausen left you feeling neither fish nor fowl, and that during your entire time at Mainz you did not seek a congregation because of your hurt and your uncertainty. I am glad that you are finally finding your way back to us. I will say to you that while your father may have named you dead to his family, and even his congregation, he did not do so to all of us. There is a place for Isaac Fremdling—for Yitzhak ben Shlomo—among the Sephardim, and we would welcome you to do more than just stand in the back like an unbelieving visitor . . . or worse, the shade of Shmuel. When you return to Magdeburg, they will make you welcome, help you to feel comfortable wearing the *talit katan* again." The absolute certainty in his voice reassured Isaac. In some faint corner of his mind, he wondered just why this greatest of his race was interested in his affairs.

"Thank you, sir. I will try to be . . . worthy of your kind support."

They turned a corner, and Don Francisco said, "As it happens, I am acquainted with someone in Aschenhausen."

Isaac managed a small laugh, little more than a hiccup. "As it happens, sir, that does not surprise me."

"Yes." Don Francisco laughed. "Well, as I said, I am a spy master. So, as you pass by Eisenach," after the other revelations of

the evening, it was no surprise to Isaac that his planned journey was seemingly common knowledge, "you might go by way of Aschenhausen."

"And is there some small task or errand I may perform for you while I am there?"

"If it's not too much trouble," the other said drolly. "I would greatly appreciate your delivering a few pounds of coffee beans to the merchant, Joachim Arst."

Isaac laughed. "Willingly, sir, willingly. For, as you probably know, I owe a debt to Master Arst."

"Indeed. Someone will deliver the package of beans to you tomorrow. Simply carry them in your baggage until that time. And do be careful." Isaac nodded. They turned another corner. Isaac looked up to see the Thuringen Gardens in front of him.

"And so," his companion said, "having enjoyed our time together, I deliver you to the arms of your companions, for if I mistake me not, you are due to begin making music in a few moments."

Grantville - Saturday evening, January 7, 1634

"Finally!" Franz hissed. "Where have you been?"

"Sorry," Isaac whispered, taking the violin that Franz shoved at him. "Don Francisco wanted to talk with me."

"Don Francisco Nasi?" Franz was incredulous.

"Do you know another one?"

Franz opened his mouth to answer, then closed it as the Gardens' manager stepped up on the platform. He pushed Isaac over to where Marla and the rest of their friends waited—Marla with studied patience, and their friends with smiles. "Remember the program."

"And now," the manager boomed, "put your hands together for Marla and her friends." He jumped down off the platform, Hermann plucked a note on his harp, Franz snapped his fingers four times and they broke into song.

*Now I've often heard it said from my father and my mother
That going to a wedding was the makings of another.
Well, if this be so, then I'll go without a bidding.
Oh kind providence, won't you send me to a wedding?*

*And it's oh, dear me, how would it be
If I died an old maid in the garrett?*

This was one of the light-hearted Irish songs they had learned from Marla's mother's album collection. Marla was having fun with it. Already fingers and toes were tapping all over the Gardens.

*Well, now there's my sister Jean, she's not handsome or good-looking,
Scarcely sixteen and a fellow she was courting.
Now, she's twenty-four with a son and a daughter.
Here am I at thirty-five and I've never had an offer.*

*And it's oh, dear me, how would it be
If I died an old maid in the garrett?*

Although he had made great strides in rehabilitating his crippled left hand, Franz was still not up to the fast pace of many of the Irish songs. For this one he had found a tambourine and was just providing a steady beat behind the music.

*I can cook and I can sew, I can keep the house right tidy,
And wake up in the morning to get the breakfast ready.
There's nothing in this wide world would make me half so cheery*

As a wee, fat man who would call me his own deary.

*And it's oh, dear me, how would it be
If I died an old maid in the garrett?*

When Marla started the third verse, Franz moved up behind her and began to mug at her, bowing his legs, pooching out his stomach and holding air in his mouth to distend his cheeks. As she got to the wee, fat man line he waddled up next to her and offered her his left hand, to the laughter of the audience, all the while keeping the rhythm of the tambourine in his right hand going against his leg. Marla slapped at him, and he pretended to duck in fear.

*So come landsman or come kingsman, come tinker or come tailor,
Come fiddler or come dancer, come ploughboy or come sailor,
Come rich man, come poor man, come bore or come witty,
Come any man at all who will marry me for pity.*

*And it's oh, dear me, how would it be
If I died an old maid in the garrett?*

All through the fourth verse, Franz continued to mug at Marla, changing his posture and expression throughout the roll call, to constant laughter from the audience.

*Well, now I'm away home, for nobody's heeding.
Oh, nobody's heeding to poor Annie's bleeding.
So, I'm away home to my own wee bit garret.
If I can't have a man, then I'll have to get a parrot.*

*And it's oh, dear me, how would it be
If I died an old maid in the garrett?
And it's oh, dear me, how would it be
If I died an old maid in the garrett?*

They finished the song with a flourish. Marla joined hands with Franz to take a bow to loud applause. They stepped back, Marla picked up her flute from a stool behind her. Isaac laid his violin down on the same stool, then stepped forward. Franz snapped his fingers again.

It was another fast, funny song. Isaac led out in "Finnegan's Wake." As he beat the tambourine Franz could see the audience just drinking this one in as well. Most everyone in the room could relate to everything in the song: workmates who loved their drink; the dangers of working on a construction site; sudden death; the wake being held in the home and the missus wanting to do her husband's memory proud with a feast; the free flowing beer and booze and the drunken brawl erupting (lots of laughter there, and several people pointing at others). Wild cheers erupted when the whisky spilled on Tim Finnegan's corpse and he revived.

Isaac picked up his violin, Marla stepped back out front, and they moved on to other songs. As the evening progressed, the Gardens got more and more crowded. Soon every chair and bench was occupied and people were standing around the perimeter of the room, elbow to elbow. There was scarcely room for the barmaids to squeeze through to pick up and deliver mugs. The Committees of Correspondence were well represented, their people having arrived early and claimed three tables near the front. Finally, the evening neared its end.

They finished an instrumental piece, and Marla stepped out front and held her hand up. The room quieted quickly.

"Thanks for coming tonight, everyone. I hope you've enjoyed yourselves." The room erupted into a roar of applause. She held her hand up again, and again the quiet descended quickly. "This will be our last performance in Grantville for a while. We leave Monday. I wish I could say we're taking this show on the road." The up-timers in the audience laughed. "But we're going to be doing some business, and when we get back we'll be in Magdeburg. But, if you get up that way, we sing sometimes at the

Green Horse tavern. Stop in if you get a chance.

"We're going to do one more song for you, another old traditional song from the country we came from.

Franz reached down and picked up his violin. He was conscious of everyone looking at him as he stepped forward, which gave him a faint chill . . . playing in public was still a bit of a challenge for him. Raising his bow, he began the introduction to the final song. At the appropriate place the others joined in, and Marla began to sing.

*The water is wide, I cannot cross o'er.
And neither have I the wings to fly.
Build me a boat that can carry two,
And both shall row, my true love and I.*

*A ship there is and she sails the seas.
She's laden deep as deep can be;
But not so deep as the love I'm in,
And I know not if I sink or swim.*

The joy of playing with Marla, of making music with his wife, filled Franz. He abandoned himself to the music while she sang, seeking to meld his violin with her golden voice.

*I leaned my back against a young oak,
Thinking he were a trusty tree;
But first he bended and then he broke;
Thus did my love prove false to me.*

*O love is handsome and love is fine,
Bright as a jewel when first it's new;
But love grows old and waxes cold
And fades away like the morning dew.*

All the others dropped out. Franz and Marla did the last line together.

And fades away like the morning dew.

They stood together for a moment, then relaxed their posture as the patrons began applauding. They joined hands and—one mind, one heart—bowed in acknowledgment.

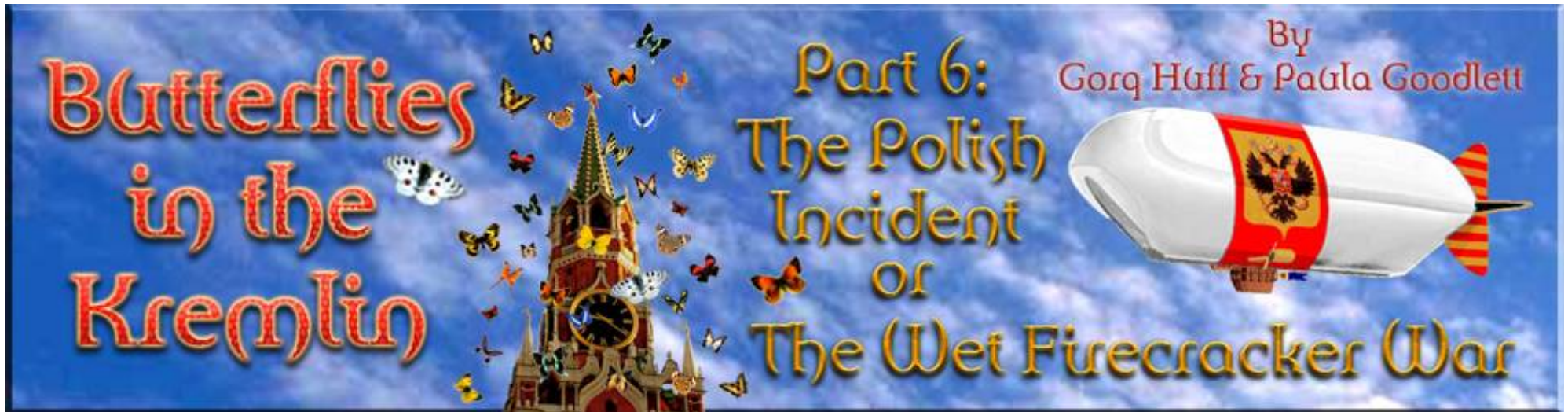
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Butterflies in the Kremlin, Part Six: The Polish Incident or The Wet Firecracker War

Written by Gorg Huff and Paula Goodlett



Third Lieutenant Boris Timrovich, Tim to his friends, was savoring the victory. Right up to the time he was called into the commandant's office. He had beaten Third Lieutenant Igor Milosevic in the Polish invasion scenario two weeks ago. And cleaned up on the deal. The betting had been five to one against him. Tim had been playing the Polish and he had won by ignoring Smolensk. After all, Poland already held Smolensk; They had held it since the Time of Troubles. And Poland, just like Russia, only had to worry about Smolensk if they didn't have it. Now he was trying to figure out what he had done wrong.

"The commandant will see you now, Lieutenant."

Tim put his shoulders back and tried not to gulp. He entered the commandant's office not looking left or right, stood at attention and saluted as smartly as he was able. The commandant returned the salute with a casual half wave. Then he asked him the last question he ever expected to hear. "So, Third Lieutenant Timrovich, tell me how you managed to defeat the entire Russian Army and take Moscow, in just ten weeks?"

"Sir?"

"Come now, Timrovich. It's all over the Kremlin. I understand the odds were five to one in favor of that baker's son, Igor Milosevic?"

"Sir? Are you talking about the Polish invasion scenario?" Tim was out of his depth. It wasn't one of the official war games.

"Yes, of course, Timrovich." The commandant pointed to a map on the left wall. The map showed part of Russia and part of Poland. "Show me how you did it."

So Tim did. "Russia is not Moscow; Russia is the Volga." He walked over to the map pointed where he placed his troops and how he moved them using the river Volga as the supply line. "In the Time of Troubles, Poland took Moscow but they couldn't keep it. But the Volga controls transport. . ." Just as Tim was getting into his description of what he'd done, he heard another voice.

"Would it interest you to know, Lieutenant Timrovich, that Polish troops took Rzhev three days ago? From the somewhat vague first reports we have, there are around ten thousand troops there now, a mixture of Slacha, mercenaries and Cossacks."

"What?" Tim spun and faced the new voice and recognized General Mikhail Borisovich Shein. Then, in a state of shock, he blurted out the first thing that come to mind.

"But that's the wrong place."

"I'm relieved to hear it," General Shein said wryly.

Tim stood mute.

"Speak up, Timrovich," the commandant said. "Why do you think Rzhev is the wrong place?"

"It's too far up river, sir. The Volga is navigable at Rzhev but only barely. Tver would be a better choice, even if it is farther. You'd want to take Rzhev, too. Later. After the first strike. But if you take Rzhev first, you warn Tver and give them time to fort up and block any river traffic from going past."

General Shein looked at the commandant. "Very well. He'll do."

* * *

After that things moved quickly. Third Lieutenant Boris Timrovich found himself suddenly assigned as aide de camp to General Artemi Vasilievich Izmailov, "Third Lieutenant Boris Timrovich reporting as ordered."

"Who are you?"

"Sir, I'm to be your Cadet aide de camp."

"I asked for Milosevic! The baker's boy." General Izmailov was clearly not pleased.

"Igor?"

"You know him?"

"Yes, sir. We're friends at the
in the Kremlin.

. " Which was the semiofficial name of the still semiofficial officer training school that was growing

General Izmailov paused and give Tim's uniform a careful once over. "Let me guess. Your father is a Boyar or Duma man?"

Suddenly it clicked for Tim. "A great uncle, sir." The pride that Tim's voice usually had in that announcement was notably missing. The general had asked for the best student in the Cadet Corps, Igor Milosevic. Instead he had gotten . . . well not the highest in family rank. There were a lot of high family kids among the cadets. It was quite the fashion these days. No, what the general had received was a cadet of acceptable social rank and lesser skill. Even if Tim had beaten Igor once.

General Izmailov was not usually placed in independent command. For the same reason . . . he didn't have enough social, family rank. In fact, he was officially second in command of the army they were raising right now, placed temporarily in command of the advance column.

General Izmailov shrugged and got down to business. "I'll be leading a reconnaissance in force and—if necessary—a delaying action while the reserves are called up. The reconnaissance force is made up in part from Musketeers Prince Cherkasski has loaned us from the Moscow Garrison." Prince Ivan Borisovich Cherkasski was the chief of the *Strel'etsky prikaz*, Musketeer Bureau. "They're under Colonel Usinov. We have small detachments from the Gun Shop and from the Dacha. And two regiments of cavalry under the command of Colonel Khilkov." General Izmailov gave Tim a look. "Usinov has more experience but Khilkov's family is of higher rank. We have peasant levies for labor battalions. About four thousand of them. We have four brand new cannons from the Gun Shop and the Musketeers we're getting have been equipped with the new AK3s. From the Dacha we're getting the Testbed, the flying machine. I am told it is to be used only for reconnaissance. And we're getting thirty of the scrapers. There won't be time to use them much on the march, but they should help a lot with fortifications when we find our spot."

Tim nodded his understanding. The assumption was that they would meet the advancing Polish forces somewhere between Rzhev and Moscow. Meanwhile Tim was assigned fourteen different jobs, some of them in direct conflict with the others. Or at least that's how it seemed. He was to coordinate with the labor battalions, the Musketeers, the Dacha contingent as well as the Gun Shop contingent, and make sure that all the various units were in the right marching order. Except that the people in charge hadn't actually decided the marching order yet. So he was given one order and then fifteen minutes later given a different order by someone else.

By noon Tim was considering the value of getting rid of the beards, as he'd read Peter the Great had done. But in his own mind, "the beards" were the idiots who kept harping on their noble rank, regardless of their true ability at war. *At this rate we'll meet the Poles thirty miles out of Moscow.*

On the first day Nikita—call me Nick—Ivanovich's dirigible contingent ended up at the back of the line of march, which meant that by the time they reached the campsite it was already getting dark. Tim watched as Testbed lifted into the night sky and disappeared. All Tim could see was the rope from the wagon, climbing into a bit of deeper blackness which hid the stars.

"Of course, it could be that there simply wasn't that much to see," Nick reported a half hour later. Tim could see that General Izmailov was less than pleased. But Nick didn't seem to be worried about it. Which Tim thought was very brave or very stupid. Then he looked over at the Testbed, which the crew was still tying down for the

night. He remembered the Nikita Ivanovich had been the first person to climb into it and had flown it without ropes to keep the wind from carrying it away. Tim still wasn't sure whether it was brave or stupid, but the 'very' gained a whole new level of magnitude.

"Timrovich! The Testbed will be placed near the front in tomorrow's order of march," General Izmailov gritted. Tim knew that the general had seen the demonstration at the Dacha and had been planning to use the dirigible and pleased to get it. But how were they supposed to know that it didn't work at night? Granted it was pretty obvious when you thought about it. Dark is no time to observe things.

* * *

"I don't believe this," Tim muttered. "We'll never get there at this rate." The march had put them about twelve miles west of Moscow. Worse, they were *trying* to move fast and doing it over good roads. The scrapers had improved the roads around Moscow quite a bit.

His friend and fellow student at the Cadet Corps, Pavel, nodded in agreement. "Bad enough the delays because of the confusion. But Colonel Khilkov and the fit he threw when we were setting out and he discovered that we were ahead of him in the line of march was just plain stupid."

Tim figured the flare up was at least half Usinov's fault with all the gloating he was doing. But he didn't say so. Pavel was Colonel Usinov's cadet aide de camp, and thought quite highly of him. "Just wait till he hears that General Izmailov is going to put the Testbed near the front of the line tomorrow." Tim threw his arms up and pretended to be having a fit. "Never let it be said that mere military necessity should trump social position in the Russian army. 'My cousin is of higher rank than your uncle, so of course my company must be ahead of yours in the order of march.'" Tim spat on the ground. "Idiots. We're all idiots. If we go on like this we'll be defending Moscow from another Polish invasion and we'll be doing it right here. You can bet that the Poles aren't sitting on their asses in Rzhev arguing about who should be first in the line of march."

* * *

Pavel could have bet that, but he would have lost. Because sitting on his ass arguing was precisely what Janusz Radziwiłł, the commander of the Polish forces, was doing. Not about the order of march, but what they should do now. Janusz, in his early twenties, was already the Court Chamberlain of Lithuania. That was a high post in the Polish Lithuanian Commonwealth which he had gotten because of the influence of his cousin Albrycht Stanisław Radziwiłł, Grand Chancellor of Lithuania. Janusz was sitting with his two main subordinates discussing the lack of the arms depot that they had been expecting. It was a rerun of several discussions they had since they had gotten to Rzhev and discovered that the Russian invasion Janusz' spy had informed him of was not nearly so near as they had expected.

"Ivan Repninov has confirmed everything?" Janusz insisted again.

Mikhail Millerov, commander of his Cossacks snorted. "You can't depend on anything that rat faced little bureau man says. I've questioned many men and his sort is the hardest to get the truth out of. Not because he's a strong man, but because he's weak. He'll tell you anything you want to hear and change his story five times in as many minutes."

"Yet what he said makes sense and fits with what the agent reported," Elias Stravinsky, the commander of the western mercenaries disagreed. "Ivan Petrovich Sheremetev is as crooked as a dog's hind leg."

"Yes!" Janusz exclaimed. "That by itself explains the situation to anyone familiar with Russia. Ivan Petrovich commits graft as other people breathe, with very little thought and continuously. And as the nephew of Prince Fedor Ivanovich Sheremetev, the third power behind Cherkasski and the patriarch.

"Fourth, if you count the czar." Mikhail Millerov corrected.

"I don't," Janusz insisted "Mikhail Romanov is his father's puppet and everyone knows it. In any case, Ivan Petrovich has ample opportunity for that corruption. He got the contract for the depot and pocketed the money."

Millerov nodded a little doubtfully, and Janusz continued. "My agent in the Muscovite Treasury Bureau spent considerable time putting together the pieces. Fedor Ivanovich Sheremetev was clearly in charge of making the arrangements. And naturally shifted contracts to where they would do his family the most good. Corrupt, every last one of them." It didn't occur to Janusz to wonder what someone on the outside might think of the Polish nobility.

"Possibly . . . or possibly your man misinterpreted a scam of the Sheremetev family and the only place the depots were ever intended to be was in the pockets of the Sheremetevs." Millerov shrugged. "At this point we'll likely never know for sure and it doesn't matter anyway, because we are sitting here in Muscovite territory. They aren't going to apologize. They're going to deny and the depot isn't here. They'll demand reparations. Granted, the Truce of Deulino expired in July of 1633. His Majesty has refused to give up his claim on the Russian throne and Russia hasn't given up its claim to Czernihów or Smolensk. So legally Poland is at war with Muscovy, but up to now it's been a pretty phony war. Little fighting and even less talking. The war is going to get a lot more real now, one way or the other. So it would be best to win it. Yes?"

Elias Stravinsky nodded. "If we go back now, we'll look like idiots. Not real good for the career, that."

Janusz Radziwiłł nodded almost against his will. He was still convinced that the reports had been accurate. The Muscovites were planning to take Smolensk and much of Lithuania, just like they had tried in that other history. But probably—as had happened before—corruption in their ranks had interfered. Still, the Cossack was right. It didn't really matter now.

* * *

"Men coming in," the scout said as he rode up to the general.

"That'll be the mercenaries from Rzhev," General Izmailov said, then looked at Tim. "Take word the column is to halt. Officers Call at the front."

"Halt the column. Officers Call, sir, at the leading unit," Tim told the commander of each unit as he rode down the line.

It was the third day of marching toward Rzhev. And this halt would probably cost them two miles. When he got back to the front, Tim saw that General Izmailov was speaking to the sergeant leading the mercenaries who had sent the riders to inform Moscow of the invasion.

"So tell me, Sergeant," General Izmailov was asking, "why did you abandon your post?"

"What post, General? We were ordered to Rzhev to guard a supply depot. When we got there, there was no supply depot. No quarters and no pay. My people were living in tents outside Rzhev. You can't guard what isn't there, sir, and we were never assigned to guard Rzhev." The sergeant pulled a set of orders out of his pack and handed them to General Izmailov.

General Izmailov looked over the orders and snorted. Then he handed them to Tim and went on to the next question. "Did you keep in contact with the invading force?" The burly sergeant shook his head. "No. We didn't see any more of them and I don't have the men to spare."

"Are the invaders coming this way? Heading to Tver? Did they even continue on past Rzhev, or did they stop there?"

"I don't know, sir," Sergeant Hampstead admitted.

Tim read over the orders and information in the packet, and stopped. *Ivan Petrovich Sheremetev*. Well, that explained why the foreign mercenaries had had been sent off to guard a nonexistent supply depot. It was almost funny. Sheremetev's greed had, for once, worked to Russia's benefit. If the mercenaries hadn't been in Rzhev the Poles might have bypassed the place altogether and headed straight for Tver. With no warning to the Kremlin until they had already taken Tver.

General Izmailov turned to a discussion with the dirigible's pilot. After discussing the dirigible and its capabilities for a few minutes, the pilot, Nick Ivanovich, said, "General, if we loose the tether, we can see more. I can usually get twenty miles an hour when I use the engines, assuming the engines work. And if the wind isn't bad when I get up there."

"When they work?" Izmailov looked dubious. "When they work?"

"They do . . . mostly," Nick said. "The engines aren't really the problem. Sometimes there is considerable leakage in the steam lines. If the steam isn't leaking too bad, I can stay up for ten hours or so. If everything goes right, I can get from here to Rzhev and back before dark."

Izmailov thought for a few moments. "All right. We'll try it. But at the least problem abort the mission and get back here." He turned back to the mercenary. "Sergeant, your officers were delayed in Moscow but we expect them to be joining us in a day or so. You and your men are to fall in at the end of the column as we pass."



Everything didn't go right for Nick Ivanovich. It was the winds. They were southerly and fairly strong at five thousand feet. Weaker, but still southerly, at five hundred. The Testbed didn't have a compressor; it couldn't lift the weight. So it couldn't pump hydrogen out of the bladders then get it back. Once the hydrogen was gone, it was gone. It did have a couple of hydrogen tanks so it could go up and down a little bit.

Nick ended up using more fuel than expected to keep on course. There was some steam leakage but it wasn't too bad. All of which meant that he *might* have made it to Rzhev and back. Or, if he went all the way to Rzhev, he might run out of fuel or water before he could get back.

* * *

"I was forced to abort, General." Nick shook his head. "Wind was awful and kept blowing me off course. But I did get a bit better than halfway and didn't see the first sign of the Poles. No advancing troops, not in this direction."

Izmailov turned to the mercenary sergeant. "Did your scouts see the entire army. This so-called ten thousand man army?"

"No," Hampstead admitted. "My scouts saw the leading elements. About three thousand men. And that's still more than my five hundred could face with any hope of victory."

"How do you know it was the leading elements? Not the whole force?"

"The formation was spread out like a screening element. Why put a screening element out when there's nothing to screen?"

The answer to that seemed obvious to Tim . . . to hide the fact that that was all you had. To bluff. Still, the sergeant's point about the size of his force was well taken. Why bluff against a force of only five hundred men? Tim could think of two reasons. If the attacking force didn't know how big the force in Rzhev was, they might try a bluff to get a force of a thousand or fifteen hundred to retreat and avoid a battle against an entrenched opponent. Two to one odds aren't that great when the enemy is behind walls.

Or it could be that the bluff—if it was a bluff—was intended not for the sergeant but for . . . well, them. The relieving force. Tim looked over at the wagons holding the deflated Testbed and smiled.

General Izmailov was shaking his head. "There are a lot of reasons why you might arrange your troops in a pattern that will, at first sight, look like a screen . . ."

The commander of the Polish invaders had not, in fact, formed his force into a screen. He had split his force into three columns of a thousand men to facilitate gleaning. The scout had spotted the center column and swung wide around it which had taken him right into the second column. He had assumed that the two columns were the ends of a large screening element but hadn't checked.

* * *

There were four wagons in the dirigible contingent. One carried the dirigible, sort of. The wagon acted as an anchor for the dirigible while on the march. The dirigible floated about fifteen feet above it, and was cranked down to ground level and tied down with spikes driven into the ground at night or in bad weather. That wagon also carried a pump which weighed just under two tons. The pump was used to compress hydrogen gas for the canisters. Another wagon carried equipment and materials for the production of hydrogen gas. A third carried equipment for field repairs and the fourth carried the repair crew. After the aborted trip, they spent two days worth of breaks on the march doing maintenance before they felt safe with the thing untethered again. General Izmailov was not pleased.

"I'm sorry, General," Nick Ivanovich said. "But there is a reason we call the dirigible 'Testbed.' It's an experiment designed to test concepts in aviation. To the best of our knowledge, nothing quite like it has ever existed in this or any other history. The engines are handmade by Russian craftsman, as are the lift bladders, the wings." Nick hid a grin.

The designer would hate him calling the control surfaces "wings." They weren't designed to provide lift, but control. In fact, they provided a bit of both. The "wings" acted as elevators at the tail of the dirigible. More were located between the gondola and the motors. They didn't provide much lift, but by pointing the dirigible's nose up or down, he could gain or lose a little altitude without having to dump ballast or gas. Or use the emergency tanks to refill the lift bladders.

"They were well made, but by people who had no way to do more than guess about the stresses they would face. It's steam powered and if they had steam powered dirigibles up-time, we haven't heard about it. That's why they built it—to see."

"So why don't we have an improved version or one of the airplanes that the up-timers have?" Izmailov sounded impatient and gruff.

"Engines, sir. Ours are both heavy and weak They wouldn't get a heavier-than-air craft off the ground. There is one engine in Russia that might lift an airplane off the ground. That engine is in the car Bernie Zeppi brought to Russia." This wasn't entirely true, as Nick well knew. The engines they had built for the dirigible would get an airplane off the ground just fine. It was the added weight of the water, the boiler and the steam recovery that had so far made down-time-built steam-powered heavier-than-air craft impossible. Without the recovery system, a steam powered aircraft would work fine for a few minutes before the water was all used up. Water weighed a lot.

"So I will have the intelligence you can gather from your Testbed only when and if everything goes right? If nothing breaks on your toy and the weather is just right?" The general glared, then visibly shook himself. "All right, Captain. That's all."

* * *

The cavalry were equally unimpressed with the intelligence gathered by Nick. And more than a few of the cavalry were resentful. Scouting was a part of their function

and, as far as they were concerned, the infantry was looking to take away the other part. They rode out almost gaily for the two days the dirigible was being repaired. But, just like the dirigible, they found no traces of the enemy.

* * *

Sixty miles as the crow flies from Moscow, Nick was ready to try again. Mostly because they were launching from closer to Rzhev, but also because it was, luckily, a still, calm day. Nick made it to within five miles of Rzhev. At five thousand feet, he feathered the engines so he would have a stable platform, pulled out his telescope and started counting outhouses and camp fires.

* * *

"Three thousand men, General, more or less. They haven't burned the town, but it's not big enough to hold them all. They have built a camp next to it. No walls, not much in the way of defensive fortifications."

"Did they see you?"

Nick shrugged. "I can't say for sure. The Testbed is big and quite visible, but I was five miles away and a mile in the air. It depends on where they were looking. No one took a shot at me and they didn't seem disturbed when I looked at the town."

"Three thousand? Is that all?" Colonel Ivan Khilkov said. "Hell, General, we've got almost that many cavalry. Send us ahead; we'll ride them into the ground." The colonel was not a fan of the new innovations in warfare provided either by Western Europe or the up-timers.

General Izmailov hesitated and Nick knew why. Ivan Khilkov was young, but from a very old family. A very well-connected family, since one of his relatives was Patriarch Filaret's chamberlain. The general could deny him once or twice, but if he did it too many times, Izmailov would find himself relieved of command, and his career ended. Nick prudently kept his mouth shut.

Four days later, General Izmailov could no longer say no. Colonel Khilkov had sent mounted scouts directly to Rzhev.

"They are fortifying the town, albeit slowly. By the time the full column reaches Rzhev, the town will be fully fortified," Khilkov said. Then he sniffed. "Send us, General. We can get there quicker than this—" Khilkov waved an arm at the wagons. "—torturous mess. The cavalry can get there in two days. By the time you can get all this there, we'll have taken the town."

There was no way to avoid it, Izmailov knew. Against his better judgment—and with a tiny bit of worry for his future—he agreed. He might very well be sunk either way it went. If Khilkov won, he'd look bad. If Khilkov lost, his angry relatives would blame Izmailov.

* * *

"Khilkov and his forces are about ten miles from Rzhev, sir," Nick Ivanovich reported.

"Very well," Izmailov said. "Do whatever it is you need to do with your . . . Testbed. If he's that close, you should see the battle tomorrow." The general paused. "Take Lieutenant Timrovich with you." When Nikita started to object, General Izmailov held up his hand. "There's no choice in this. He is from a good family. If things go well tomorrow, it won't matter—but if they don't, you and I will need his report."

By this time, the main column was only about forty miles from Rzhev by air. Which, unfortunately, meant quite a few more miles on foot. Fortunately, it was short-hop range for the Testbed. Nick spent the rest of the day doing maintenance and preparing for the overloaded trip to Rzhev. The general consensus was that tomorrow he would have a ringside seat for a glorious feat of victory by Russian cavalry. General Izmailov clearly wasn't so sure, and Nick shared his doubt. There were probably a few others who were less than sanguine about the outcome. Sergeant Hampstead was one of them; his commanding officer, Captain Boyce, who had joined them on the march was another.

* * *

"I'm told I'm going with you."

Nick Ivanovich looked over at the young lieutenant. "Yes, so General Izmailov told me. That's why I'm pulling two of the four hydrogen tanks. We'll also be taking less ballast water and less fuel." Nick wasn't happy with the situation but he rather liked Tim, one of the more innovative young officers in the Russian army. And young was the word. Tim might be seventeen, but he looked closer to fourteen. "Bernie Zeppi said once that the glamour of flying would get to almost anybody. But it's bloody dangerous up there. A dirigible is a balancing act. Look there . . ." He pointed. "Those are the lift bladders. They pull the dirigible up but not by a constant amount. The higher you go, the thinner the air; as the air thins the bladders expand. As the bladders expand, they provide more lift."

"So the higher we go, the more lift?"

"Right. And that's part of the problem. Because the goal is to go up a certain distance, then stop going up. We can't add weight once we take off, so once we get to the height we want—actually before we get that high—I start releasing hydrogen from the bladders. Now what do you think happens when we start coming back down?"

"We get heavier."

"Right. But I've already thrown away the hydrogen that started in the bags. So to counteract that getting heavier, I add hydrogen from these tanks . . ." Nick pointed at the tanks in the gondola. ". . . if I've got enough. Or, I can turn this valve which releases water from a tank. But that water is the same water we use in the steam engines, so I can't dump it all or we run out of power. What happens if we start coming down and I'm out of hydrogen and water?"

"We crash."

"Right. Also the Testbed here has as much surface area as a three-masted schooner has sails." *Well not really*, Nick admitted silently, *but it doesn't have a hull in the water holding it in place either*. "So a sudden change in the wind and we can be a hundred yards away from where we want to be before I can even start to compensate. If we are facing into the wind, or close to it, the engines are enough to move us through the air. But if the wind is from the sides, the wind wins. If it rains on this thing, the weight of the water means even with all the ballast overboard and the bladders at capacity, we don't have enough lift. We had to drop the radiator more than once in tests at the Dacha and the aerodrome where they are working on the big one. We haven't had to drop the engines or the boiler yet but it's rigged to be able to."

Nick went on to explain about the various controls. The fifty pound weight that didn't seem like that much till you realized that it could be moved from the tip to the tail of the Testbed to adjust its balance and angle of attack. That not only the wings, but the engines at their ends rotated as much as thirty degrees, to provide last minute thrust up or down for takeoff and landing. Especially landing. The steam engines could reverse thrust with the turning of a lever, so the Testbed didn't need variable pitch propellers.

* * *

"It is a beautiful sight," Tim said. "Banners flying . . ." He paused a moment, then sighed. "A beautiful sight, noble and glorious. But at the Kremlin in the war games they treated pike units as fortified. Not easy to overrun. Colonel Khilkov didn't think much of the war games." In a way this was like one of those war games, an eagle's eye view. Tim had played a lot of them, and suddenly, as he watched, he could see the little model units on the field below. He remembered one of the games—an unofficial game—when one of his fellow students had had a bit too much to drink. And ordered cavalry to attack undispersed pike units. You were supposed to hit them with cannon first, to break up their formation. And he remembered those cavalry pieces being removed from the board. Igor had stood, held up one arm, wobbled a bit, lifted the arm again and proclaimed "But, I died bravely!" They had all laughed. Suddenly it didn't seem funny at all. "Colonel Khilkov thinks the Poles will break when faced with a cavalry charge . . . and General Izmailov didn't seem to agree."

"You're sounding a bit, ah, concerned there, Tim." Nick peered through his telescope toward the Polish forces.

Tim nodded. "Colonel Khilkov is . . . a bit difficult."

The Polish forces didn't flee. Three thousand Russian cavalry faced a wall of about two thousand Polish infantry, armed with pikes and muskets, as well as the Polish cavalry. The infantry stood in ranks and waited. Then they lowered their pikes and the Russian cavalry charge ran headlong into a porcupine made of men. Then the Poles fired. It was unlikely that the volley killed many men, but it was enough to shatter the Russian formation.

Then it was the Polish cavalry's turn. They were outnumbered but they were fighting a scattered unit. Colonel Khilkov tried to rally his men and almost managed it. But the Polish infantry had slowly—as infantry must—advanced while the Polish cavalry had been cutting its way through the Russians. Once their own cavalry was mostly clear, the Polish infantry opened fire again.

"It's all over, mostly," Nick said. There was, it seemed to Tim, a coldness in Nick's voice he had not noticed before. "We'd better head back to General Izmailov and tell him."

Tim nodded, tears blurring his sight. He kept seeing little cavalry units being picked up off a playing board while he looked at the clumps of bodies on the field. It was too far to tell but he knew many of the men in those cavalry units. He knew some of men whose bodies made up those clumps. "The general's not going to be happy." The little boyars with their fine horses had left the field, those that still could. Routed by soldiers who worked for pay, not glory. Nikita restarted the engines and headed to the column.

* * *

By the time they got back to the column, it was crossing the Volga at Staritsa and Tim had himself well under control. He made his report and the general discussed the way the battle had gone. Whoever had commanded the Poles had kept his Cossacks in reserve. Which was a bit of a surprise; probably the greatest Russian weakness was in tactical mobility. Of course, a Russian army that was mostly cavalry was unusual, too.

"I am concerned about the loss of the cavalry," General Izmailov echoed Tim's thoughts. "The cavalry units were most of what tactical mobility we had. We can't afford to be caught away from the Volga. We'll need it for supply. It's a hundred miles along the Volga from Tver to Rzhev. I am going to take the main force straight to Rzhev. But I am sending Captain Boyce and his people along the river to grab up every boat they can find. You're going with them, Tim. I don't really think they'll bug out again, but better safe than sorry."

"Yes, sir. What do I do if they do bug out?"

"They won't. That's why you're going. I'm sending a squad of musketeers with you, but they are just to keep you safe. Captain Boyce knows that if his company fails in its mission, you'll take the musketeers and come tell me about it. Then he and his people won't get paid."

* * *

To supplement their rations, the Musketeers with their new AK3s went hunting between villages. Russia was sparsely populated compared to the rest of Europe and there was quite a bit of game. Captain Boyce and his sergeant were impressed with the guns. When they asked Tim about it, he called on one of the musketeers to do a show and tell.

Daniil Kinski set the butt of the AK3 on the ground and the tip of its barrel came not quite to his nose. If any of them had been familiar with the up-time weaponry, they would have noticed a marked similarity to a Kentucky long rifle. But that similarity was not complete. Like the long rifle, the AK3 was a flintlock with a long, rifled barrel. It was forty inches long, if you didn't include the chamber, which was four inches long. Daniil then lifted the AK3 and showed them how the chamber was removed. "The chamber, as you can see, is a steel case, not including the quarter inch lip that inserts into the bore of the barrel. Behind the lip, the front of the chamber is flat and supposed to fit flush to the bottom of the barrel. It doesn't always fit as flush as we'd like, so we made some leather gaskets." He pulled the gasket off the chamber and showed them. "We still have the flash from the pan and the touch hole, but that's no worse than any flintlock."



Daniil stuck the gasket back on the chamber and the chamber back in the rifle primed the pan, cocked, aimed, and fired.

Crack!

Then he pulled the chamber out, stuck it in his pouch, inserted a loaded chamber with a gasket already on it into the AK3, primed the pan, aimed, and fired again.

Crack!

Relative to muzzle loading a musket it was very fast. Plus, since both shots had been aimed, they had both hit the tree that was his target . . . some eighty yards away from where they were standing.

Daniil pulled the second chamber from the AK3 then leaned the rifle against a tree while he showed them how to reload the chambers. Daniil filled the chamber with a measured amount of black powder then pulled out a lead cylinder "It doesn't use a round ball, it uses a Krackoff ball." Which an up-time observer would note had a certain resemblance to a Minié ball, in that it was a cylinder with one flat end and the other rounded. But it fit snugly into the chamber. "Push down till the Krackoff ball is flush with or a little below the lip of the chamber," Daniil said. The chamber wasn't cylindrical on the outside. Instead it was designed to fit into the AK3 only in such a way that the touch hole lined up with the flint lock on the side of the rifle.

* * *

A week later, while Tim and his crew were still collecting boats on the Volga, the Russian force surrounded Rzhev. In a way, General Izmailov was surprised. His force seriously outnumbered the forces in Rzhev and he had half-expected the commander of the Polish mercenary force to realize that and withdraw.

Janusz Radziwiłł had considered doing just exactly that. His officers had suggested it. However, Janusz was a young man who had already thrown the dice. If he retired from the game now, things could get really bad at home. Besides, the ease with which they had dispatched the cavalry suggested that they could hold and break the Russians against their recently built ramparts. So he allowed General Izmailov to reach the town, hoping to bait him into to another rash attack.

General Izmailov didn't take the bait. Instead, he surrounded the Polish encampment and started fortifying, using the *golay golrod*. Now it came down to a question of who would be reinforced first.

* * *

"What are those things and what good are they?" Tim looked up at the badly accented Russian. It was the sergeant from the mercenaries. Ivan—no, John was the English form—John Charles Hampstead. He must not have been near Moscow during the testing. The army had been encamped around Rzhev for about five days when they arrived.

The mercenaries of Captain Boyce's company had done a decent, if not spectacular job. "*Golay golrod*. Walking walls, you might say, or walking forts."

Hampstead said, "Fine. That's what they are. What good are they?"

A group of peasant draftees were pushing one of the *golay golrod* into position. Tim pointed at them. "They are made of heavy plywood. They let us build fortifications very quickly. In winter we can even put them on skis for ease of movement. Right now, of course, they're on wheels . . ." Tim's voice trailed off. He thought a moment.

It was *heavy* plywood. The panels were a good three inches thick. The wheels could even be turned a little bit. And that's what the workers were doing now. They were pushing the wall back and forth to maneuver it into a gap in the wall. One of the things that had come out of the testing was that the walls were a lot more likely to stop a bullet if it hit them at an angle, so they were being set up at an angle to the city wall around Rzhev. Since the workers were filling in a gap in the wall, they were quite prudently staying behind the wall they were moving. Even if they had been in effective range of the Polish muskets—which they weren't—all the Poles would be able to see was the wall. Not that the workers seemed convinced of that. They were peasants, not soldiers of any sort. They weren't armed and weren't expected to fight, but were here to carry supplies, set up camp, and other support roles.

Tim realized that the workers were right. If they had been on the other side of the *golay golrod*, they would have been shot at and, if unlucky, hit. But the way they were doing it they were, if not perfectly safe, close to it. There was a narrow gap, less than half a foot, between the bottom of the wall and the ground. But to hit a target that size with the kind of muskets Hampstead and his men had, would take a lucky shot at ten yards.

That's when the plan began to come together. Not all at once, but in pieces. Tim could see the walls being shoved, one in front of the other . . . making a partial wall between their present position and Rzhev. But how would they get back? More walls. It came together in his mind. A slowly shrinking siege wall. A tightening noose around Rzhev. As the noose got tighter, the dead zone between the siege walls and the city walls would get smaller. He forgot, almost, that this was real, not a war game played at the Kremlin. Forgot, almost, that he was the most junior of aides to the general. Almost . . . but not quite. So it was with great humility and trepidation that he approached General Izmailov.

* * *

The general listened. Why not? It was a siege and he had nothing else to do at the moment. Except for smoothing over disputes of precedence or paperwork that his secretary could do better. After due consideration, he decided that it was the beginnings of a possibly very good plan. They would have to take into account that the *golay golrod* were less than completely effective when hit face-on by enemy fire. So rather than a tightening noose, it would be more like a spiked collar with the spikes on the inside.

* * *

Back in Moscow, things were not going well. The same people who would have wanted General Izmailov's head for denying Colonel Khilov the opportunity to rid Russia of the Polish invaders now wanted his head for "ordering" it. Calls for his removal were brought up in both the *Zeminsky Sobor* and the *Duma*. Others were afraid of offending the Poles and bringing about a repeat of the events of the up-time Smolensk War by squandering resources. Still others pointed out that the size of the invasion had been grossly overestimated. The close to ten thousand men that General Izmailov had should be plenty. Between the three factions, they blocked any attempt to send reinforcements. And almost blocked resupply.

* * *

Crack!

Janusz Radziwiłł ducked behind the Rzhev city wall, cursing the Russian forces. He wasn't a happy camper. He didn't like that the Russian guns could reach farther than his. He didn't like that the *golay golrod* seemed to be being used in a brand new way. Most of all he hated the Testbed. "I hate that damned thing. Every time it's up there, it's watching every move we make and telling the Russkies just what we're doing."

Colonel Millerov looked up then nodded. "I'm none too happy with it myself. I feel like I'm being watched every minute of the day. But—" He pointed. "—I'm just as worried about the walls they're pushing inwards. And what's going to happen if the Rus get here and get in before our reinforcements get here."

"Help should be on his way from Smolensk." The last messenger had arrived just days ago. He had to swim down the Volga at night and sneak up the bank. But he had reported that the Smolensk garrison was coming.

"They need to speed it up," Millerov said. "Once those forces get here, we'll have them between us and the relief. And there's no way out for them." He paused. "If they get here in time, that is."

* * *

"General Izmailov, sir." Nick paused to think about his report for a moment. "A force of about eight thousand men is approaching from the southwest. From Smolensk, as near as I can tell. They'll be here in a week."

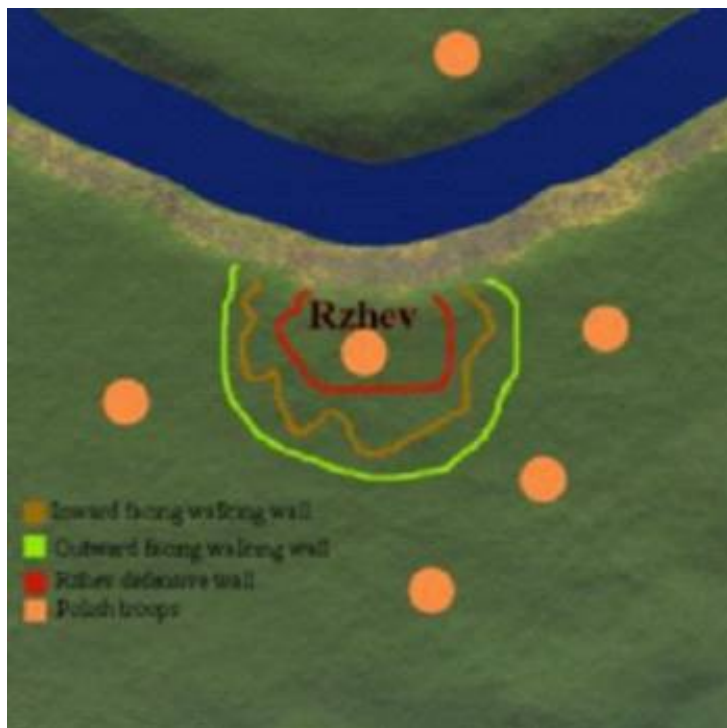
The general looked grim. "Well, we knew it was inevitable."

He began issuing orders. "Tim, now that we've tightened the noose around Rzhev, we've got plenty of wall sections. We'll use them to build our own fortifications between us and the oncoming force. Arrange it." It wasn't a good solution but it was the best he could do with what he had. One thing he didn't want to allow was relief of the siege of Rzhev. Instead his force would be both besiegers and besieged.

"Yes, sir." The young lieutenant—who was looking older by the day—took off toward the peasants and soldiers who were used to move the walls.

Work on tightening the noose around Rzhev was halted while the Russians set about making their own defensive wall. To General Izmailov this was looking more and more like a carefully-laid plan where someone had jumped the gun. Tim was right about the Volga, or at least he might be. If the Poles got a base on the upper Volga, they would be in a much better position to press Wladislaw's claim to the czar's throne. If the enemy got Rzhev and Tver and held them for a while, they could build up supplies and equipment to make a rapid advance by way of the Volga. They wouldn't need to take Moscow, just cut it off from the rest of Russia. Besides, if they held the Volga to Novgorod, they held the mouth of the Muscovy River. Apparently, someone in Poland had realized that Moscow was a false key to Russia.

It was the rivers that controlled Russia, not Moscow. Especially if the Poles had their own up-timer somewhere to make them steam-powered river boats. Russia had steamboats, they were running up the Volga daily bringing supplies. What they weren't bringing were reinforcements. Izmailov wondered if the people back in Moscow were crazy.



Meanwhile, everyone was working to get a second wall up about fifty feet outside the first and to get all their supplies between the two walls. That would give them a corridor that would stretch from the river on one side of Rzhev to the river on the other side. Rzhev was located on both sides of the Volga, but a bluff on the north side of the river commanded the lower city on the south side. For now, Izmailov would cede the lower city to the Poles. He could take it back easily enough once they had the upper city in their hands. There had been a ferry between the two, but that was easily dealt with. The Volga here was a bit over a hundred yards wide, making it impossible to occupy both sides of the river without dividing his force. The good news was the volley guns and small cannon placed at either end of the corridor, could prevent the Poles from resupplying Upper Rzhev by crossing the Volga. That same bluff gave the Russian guns an advantage when protecting their resupply.

"All right, Nick. From now on you base out of Staritsa. I want you well away from Cossack patrols." Starista was about thirty miles as the crow—or the Testbed—flew, a bit over fifty miles along the river. And it had enough defenses to keep the Testbed safe. "Do you really think the blinker lamps will work in daylight?"

"They should, General. The lamp on the Testbed is located in shadow, so as long as we stay out of the sun, you should be able to see the flashes. You have the grid map and we got a good enough look at their army to give a good read on their units. They have been designated A through K. We'll send an offset for the code wheels at the beginning and end of each message."

"What about us sending you messages?"

"Should work about the same. Blink at us from a shaded spot." Nick said. "What really worries me, General, is . . . well, they will know that we are telling you their locations. And we can't stay up all that long. They can just wait for us to leave, then move their units and attack where you're not expecting it."

* * *

"Pity about that," Aleksander Korwin Gosiewski said. In general, Gosiewski was quite pleased with the way things had gone since his forces left Smolensk. He wouldn't have done what Janusz Radziwiłł had, but since Janusz had opened the way Gosiewski was fairly sure that he was safe from the political repercussions. And if it increased the size and power of Lithuania within the Polish Lithuanian Commonwealth, that was all to the good.

"Our eight thousand and three thousand in Rzhev . . ." He felt confident that he could rout the Russians. His force was a modern army, six thousand infantry, two thousand cavalry. "But I would have liked to capture that balloon. I doubt it will return; I suspect the Rus commander has sent it away to keep it out of our hands."

He nodded to his subordinates. "But it doesn't matter that much. There is a time for subtlety, gentlemen, and a time for more direct means. This is the latter."

"Sir!" Colonel Bortnowski said.

"As soon as their balloon is out of sight, Colonel, you will take the Seventh Fusiliers. . ." Gosiewski continued with a list of units designated to attack the east downriver edge of the wall. "We will hold here until the artillery has produced a breach in their *golay golrod*. You will then advance. Our situation is simple. Once we get within their outer wall, at any point, they are done and we can roll them up. The Russian soldiers don't have the stomach for a standup fight. They carry walls with them, so they'll have something to hide behind. Take that away and they're like sheep among wolves."

It took another hour to work out all the various details, including a skirmish against the upriver edge of the wall to pull the defenders away from the planned breach point.

* * *

"General, the Poles are moving," Tim said as he entered the tent.

"What?" the general had been taking a nap. He sat up on his cot. "Their cannon?"

"Not yet, sir."

"Very well. Give me ten minutes."

By the time General Izmailov got to the walls, the Russian corridor was acting like a disturbed ant bed. Izmailov didn't rush. He strolled. Exhibiting no hurry, he listened to reports as he went, stopped and greeted people. And, to an extent, the ant bed calmed. Actions became less frantic and more purposeful. When it was reported that the Polish cannon were moving into position, he quickened his pace and started giving orders.

"Get those guns in place!" The small, rifled, cannon of the Russians were moved into position, set up and loaded behind sections of wall. Ropes were attached to those wall sections so that they could be quickly moved out of the way.

"We'll give it to them now, boys," General Izmailov shouted. "Before they realize what hits them."

The order was given while the Polish cannon were still out of effective range. *Their* effective range—not the effective range of the rifled breach-loading Russian guns.

The men on the ropes strained and the walls moved out of the way.

"Aim them! Don't just point them randomly!"

The gunners took a moment to refine their aim.

"Fire!"

Boomcrack! Boomcrack! Boomcrack!

The small cannons sounded like they couldn't make up their mind whether they were cannon or rifles. The rounds they fired were small, just under an inch across and three inches long. But they exited the Russian guns in a flat trajectory and went precisely where their gunners told them to go. Two rounds hit the outer wagon of the Polish gun train. The third missed; it hit a wagon wheel which was shattered. Pointlessly, since the exploding powder wagons would have destroyed it a tenth of a second later anyway.

A Polish gunner lay on the ground, blown off his feet but otherwise uninjured, shaking his head less to clear it than in confusion. They were half again out of a cannon's effective range. Even as he lay there, another *boomcrack* and the gun carriage of one of the six polish *sakers*, or nine-pounders, shattered as a smaller but faster round ripped through it. The gunner, after due consideration, decided that where he was, was a rather good place to be. Much better than standing up next to the guns.

Aleksander Korwin Gosiewski was not so sanguine. In the midst of disaster, he saw what he wanted to see. The Russians had opened a breach in their wall to allow their cannons to fire. He decided that if he moved fast enough he could exploit the breach. He rapped out orders to Colonel Bortnowski and sent off the messenger. "Attack now. Go for the breach. Charge damn it! Charge!"

Much against his better judgment Colonel Bortnowski charged. Sort of. The charge of a pike unit is rather akin to the charge of a turtle. Slow and steady. Which may win the race and may even win a battle when it's charging another pike unit. But when charging a wall two hundred and fifty yards away and when that wall is manned by troops with rifled breach-loading AK3s that can be fired, have the chamber switched, then fired again several times, the charge of a pike unit becomes an organized form of suicide. Eventually, of course, the pikes broke. But not nearly soon enough. Their casualties were much worse than the casualties the Russian cavalry units had suffered just weeks before. Colonel Bortnowski was among the dead. They really should have used the Cossack cavalry, but it was in the wrong place.

The Polish force withdrew, but it was only temporary, as General Izmailov knew quite well.

* * *

"Gentlemen, our situation is untenable as it stands," General Izmailov said. "We must take Rzhev and soon. Tim, I want you to coordinate with the unit commanders,

start tightening the collar again. Get us salients as close to the to the walls of Rzhev as you can. . ." The general described what he wanted and work began again. The plan was to get several points right up against the walls, such as they were, of Rzhev. Which would still leave the problem of defending against a potential attack by the Polish relief force while at the same time using most of his force to breach the defenses of Rzhev. To attack effectively—and just as important, quickly—they would need overwhelming force against the troops occupying the town. To get that, they were going to have to virtually strip the outer *golay golrod* of fighting men. And like any fortification, no matter how temporary or permanent, the walking walls needed to be manned be effective.

Two weeks later they were in position and as ready as they were going to get. At the closest point the inner *golay golrod* was only twenty feet from the makeshift walls around Rzhev and there were five points where they were within fifty feet.

* * *

Nick gave a bit more steam to the right side engine to turn the Testbed left. The winds were gusty. He had gotten word a week before that they would be making the attack on Rzhev today. His job was especially vital because to make it look real they had to know where the Polish forces were attacking long before it happened. He looked out and noted the position of a Polish cavalry unit.

Rrrriiiippppp!

Nick looked up and swore.

The gas bladders on the Testbed were made of goldbeater skin. Ever have knockwurst? Well, goldbeater skin is basically the same stuff they put around the sausage, the intestines of large animals. For goldbeater skin, the intestines are cut open and glued together a couple of layers thick. The sheets of goldbeaters skin are mostly self adhesive and formed into short, fat sausage shapes rather than round balloons. It had never occurred to anyone to wonder what would happen if you applied steam.

Granted, by the time the steam reached the steam bladder it had cooled quite a bit. On the other hand, the steam bladder on the Testbed had by now been slow cooking for several weeks. A little bit of extra steam pressure was all it took. Of course, it gave along the seams. As soon as the rip happened, the steam spread out still further and turned into mist, then started condensing onto the other gas bags in the Testbed where it did comparatively little harm. But the steam cell was gone; its lift was gone. The gondola lurched. Nick swore again and reached for a lever to angle the thrust that remained to him.

The steam bladder, when filled and functioning properly, provided about five hundred pounds of lift to the Testbed. The semi-rigid airship had just gone from neutral buoyancy to five hundred pounds *negative* buoyancy. Which didn't mean it dropped like a five hundred pound lead weight. It was more like a five hundred pound feather. The steam bladder was located three-quarters of the way to the front of the Testbed, just above the gondola, so naturally it nosed down. Which meant that the engines were pushing down as well. Airships dive like they do every other maneuver. Slowly. A similar disaster in an airplane would have given the pilot less then two minutes to fix the problem, as the plane nosed over and accelerated to over a hundred miles an hour straight down. Nick had a good five minutes before he would hit the ground.

First, reverse thrust on the steam engines. Nick shifted a couple of levers. Then, angling the thrust—he shifted more levers as he continued to lose altitude. Shift the trim weight. More work. He had to crank it back to the tail of the Testbed. In doing these things, Nick lost about two thousand feet of altitude.

* * *

"It's coming right at us!" one man screamed.

The big balloon looked to the Polish troops on the ground like it was making a slow-motion dive-bombing run. Not that they had ever seen a dive-bombing run of any sort. The nose of the Testbed was pointing straight at them and it was billowing white smoke. Steam, actually, but they didn't know that.

"Fire, you bastards! Fire!"

Chaos reigned for minutes. Some the men decided to be elsewhere, but a surprising number stood their ground and started shooting.

The Testbed was still out of what could reasonably be considered effective range of a seventeenth-century musket. but it was significantly bigger than the broad side of a barn. Even a big barn. Inevitably, it got hit several times. Bladders filled with hydrogen were struck by musket balls. And nothing much happened. To get hydrogen to explode takes three things, hydrogen, oxygen and a spark. The hydrogen and oxygen need to be mixed together fairly well to get any kind of significant flame. But the crucial issue here was the lack of a spark. The lead shot back from the muskets was indeed still quite hot, but not that hot. Besides, there was all that steam condensation on the bladders and the skin of the Testbed.

"Nothing's happening! It's still coming!"

By the time Nick had the Testbed leveled out at about twenty five hundred feet above ground, it had a couple of dozen holes poked in the skin and three of it's four hydrogen bladders had holes poked in them. It takes a long time for the hydrogen to leak out of a balloon forty feet across. The Testbed continued on, as best anyone on

the ground could tell, totally unaffected by the shots fired at it.

* * *

As best anyone on the ground could tell.

"Damn it," Nick said. The Testbed was losing lifting gas and was already negatively buoyant. Further, it was not recovering any of the steam it was using to run the engines. So while Nick had hours of fuel left, he had five or ten minutes of water and when that ran out, he would lose power. Nick headed for base. He didn't make it. He literally ran out of steam just over half way there. Absent the engines which had been holding him up, he started to sink, fairly slowly, to the ground. Nose first.

* * *

Back at the battle, Gosiewski saw his opportunity but had some difficulty exploiting it. After the disastrous attack of the first day there wasn't a lot of enthusiasm for frontal attacks on the *golay golod*. It took a while to get things organized.

* * *

Hot Shot Hampstead looked over at his captain. "They'll be coming, sir. Now that the balloon is gone."

"I know." The captain nodded. "But where?"



Hot shot shrugged. "Maybe on the left. There are some gaps on that side. Sure as heck we can't be everywhere." Their unit had been left on the outer wall to stiffen the peasant levies which were unarmed, just there to make it look like the wall was manned. The peasants had sticks painted to look like rifles and muskets, because the Russian government wasn't real big on arming peasants. Armed peasants tended to turn into Cossacks or bandits. Not that there was much difference between the two. So Sergeant Hampstead and Captain Boyce had been assigned to go to wherever the Poles attacked and shoot so that it looked like the whole wall was manned by armed troops.

Captain Boyce nodded again. "It's as good a place as any, John. Start shifting the men." They could hear shooting from behind them. The Russians were in Rzhev and

would be occupied for hours cleaning out the Polish troops in the town. If the outer wall was to hold, it would be them that held it.

* * *

"Form the men just inside the wall! We're going to wait right there."

"What about the firing ports, Captain?" Hot Shot wanted to know.

"I'm getting sneaky, John," Captain Boyce told his sergeant. "As important as holding this part of the wall is, convincing the Poles that we are just one of the units manning them is just as important. We need to give them a reason why the other parts of the wall aren't shooting." Then he turned to the peasant levies. "Who's in charge here?"

Having identified the man, Boyce explained what he wanted. "Tie ropes onto the *golay golrod*. When I give you the word I want you to pull these two sections apart. As quickly as you can. Then when I tell you, push them closed again."

Then man nodded and started giving orders. It would give them a roughly twenty foot front. "John, two ranks only and keep the pike men in reserve. Have the men fire as the *golay golrod* clear the breach. Then fall back as soon as they have fired. Reload and reform as the walls come back together."

* * *

It didn't go like clockwork. Unless you were talking about a clock with a busted arrester gear.

"Open!" The walls started coming back with dozens of men pulling each wall. The troops started firing. *Blam Blam, Blam Blam*, and the walls retreated. And they did a credible job of retreating behind the *golay golrod* but then it went to hell. Some men kept going, others stopped too soon and the walls caught up and passed them, leaving them exposed to enemy fire. Almost no one had time to reload because they were too busy moving. Then there were the Polish troops—they had been taking sniper fire from those walls for weeks. As best Boyce could tell, no one gave the order but the Polish formation went into a charge as the walls opened. They took casualties, lots of them, since Boyce's troops were firing from pointblank range. But the Poles saw the breach and ran right over their fallen to get to it.

Boyce ordered the wall to close before it was all the way opened. But it wasn't soon enough. The walls didn't close all the way; they were blocked by Polish troops.

Boyce on one side and John Charles on the other, they struggled to reform the men and close the breach. They weren't alone. The Russian peasants armed with whatever was handy were right there with them.

* * *

Ivan didn't really know why he'd been assigned to this wall section, or even why he'd been pulled away from his farm. But one thing he did know was that Polish forces loose in Russia were a bad thing. He'd been hearing the stories all his life, how the Poles had decimated his village and killed his grandfather.

He didn't have one of the fancy guns the soldiers had, but he did have a shovel he used to flatten ground for the walking wall. If nothing else, he and his peers could use their heavy painted sticks against the Poles. And they would, he knew. Nobody wanted the Poles in charge again. The boyars were bad enough.

So he stood in the shadow of the wall, waiting for the inevitable rush of men trying to get inside. Then he swung the shovel, blade out. The Pole dropped to the ground and Ivan swung at the next one. Misha was swinging just as frequently. Some of the Poles got past, of course. A shovel doesn't have much chance against a sword, a pike, or even a flint-lock pistol.

Still, they kept swinging.

* * *

"Get a message to Izmailov," Boyce shouted across the breach. "Send a man, now!"

Hampstead grabbed the nearest man and sent him inside Rzhev. "Tell the general we need more men. And we need them now, if he doesn't want the fucking Poles up his backside!"

In a sense, Boyce's trick had worked.

* * *

To the Poles it did look like one more weird Russian maneuver using the *golay golrod*, but their commander thought that this one had backfired. It was clearly poorly planned and not drilled nearly enough. At least, not at the place the Polish force had attacked. It might work better at other points along the line, but that didn't really matter. They had a breach and poured everything they could into it. The unsupported peasants at other places along the wall were not attacked. And the maneuvering to bring forces to the breach cost the Poles time.

* * *

"Back to the walls," Izmailov roared. "These pigs are well stuck."

Janusz Radziwiłł was dead, and most of his officers. The remaining force inside Rzhev were rounded up and under guard. "Back to the walls," Izmailov roared again. Tim gathered the men he'd been leading and headed back to the breach in Rzhev's walls.

* * *

"There's nothing there but peasants and sticks," Gosiewski shouted. "You're not turning back from peasants, are you?"

The Polish forces pushed toward the breach again.

* * *

"Here they come!" Tim's voice cracked on "come."

But it didn't matter that he was only seventeen. The men followed him readily. Nor were they the only group. Russian troops were turning over their prisoners to anyone handy and heading back to the walls. Unit cohesion ceased to exist. But by then most of the Poles in Rzhev were unarmed and most of the citizens of Rzhev weren't.

Suddenly Tim stopped dead in his tracks. They had reached the outer wall but the Poles weren't actually coming at them. They were nowhere near the breach. The Poles were crossing in front of them, not preparing to attack. He looked around trying to make sense out of the confusion and chaos that was battle.

Rzhev had been retaken. The volley guns and cannon that had been preventing resupply were no longer needed in that role. They hadn't been moved in preparation for the battle because the general didn't want the Poles across the Volga making a dash to reinforce Rzhev "while we're trying to take it back." But now, what purpose were the volley guns serving? He turned to find a man with an AK3 near him.

"Can you hold here with what you have?"

"I should be able to. Besides more men are coming all the time. What you have in mind?"

What Tim had in mind was so far above his authority that it wasn't even funny. "Never mind. You men! Stay here." Then Tim ran. By going inside the inner wall, he shortened the distance he had to travel considerably. It still took him ten minutes to reach the volley guns. And considerable shouting to get them to pull away the wall section. "The general's orders! Bring the volley guns and follow me."

Of course, they weren't the general's orders; they were Tim's orders. And if the general decided to make an issue of it, Tim was going to be in a great deal of trouble. But somewhere during the battle the career of Lieutenant Boris Timrovich had decreased in importance. What was vitally important was getting the volley guns where they were needed.

Tim stood on the volley gun platform, which was being pulled by two steppe ponies. It wasn't a grand gesture; he needed the height to see over the wall to locate the breach. "That way!" He pointed. "Another hundred yards."

Tim and the gun crew were inside the inner walking wall. Just on the other side of it was a mob scene, packed with Poles slowly pushing back. The Russian defenders were spread along the wooden trench made by the two walls. Carefully, they lined up the volley guns at points where wall sections met.

That was when Tim realized the flaw in his magnificent plan. The *golay golrod* were made up of wall sections that could be latched together. But the latches here and now were on the other side, they couldn't open the walls. They knew where the latches were; there was one near the top one and near the bottom. Tim cursed himself for a fool. "We'll have to move the volley guns to where we control the walls." He climbed back up on the gun platform and looked over the wall again, almost getting shot for his trouble. "Over there." He pointed back the way they'd come "three wall sections."

When they got to a section that the Russians mostly controlled, Tim used the volley gun platform and scaled the wall. This time he almost got chopped up by a Russian peasant with a shovel already bloody and covered with gore. "Open the walls! Open the latches! Let the volley guns through!" And, surprisingly enough, that's just what they did.

The Russian version of the volley gun was an outgrowth of the same technology used in the AK3. The plates were loaded with black powder and minié balls and were ignited by a quick fuse. They were slower firing than the ones in the west, but Russia was still having trouble with primers. They had twenty-four barrels arranged in three rows of eight. And the prep work was done on the chamber plates hopefully before the battle started. So all that was needed to reload was to pull a chamber plate and replace it with another then light the fuse. They were cranked, but only for traversing.

They last Russian slipped from in front of the volley gun. The gunner lit the fuse and started cranking. *Crack Crack Crack Crack* . . . twenty-four barrels in order. Then the gunner pulled the plate, inserted another and did it again. The gunners for the volley guns were big men. The plates weighed upwards of thirty pounds.

The volley guns wouldn't have been enough by themselves, but they took the pressure off the Russian troops long enough for a semblance of organization to occur.

Unarmed peasants retreated to be replaced by armed musketeers carrying AK3s and the weight of fire shifted.

* * *

"Lieutenant Timrovich, you are to report to the general's quarters."

Two weeks after the battle, things had stabilized. Rzhev was surrounded by three walls, one inside the other. The Rzhev wall that had been built in a somewhat haphazard manner by the Poles and the two layers of *golay golrod* together constituted a formidable defensive network. Starving the victorious Russians out would take time. Meanwhile, the walls were bolstered by sand bags and firing platforms. Neither Tim nor General Izmailov had yet had occasion to mention Tim's orders to the volley guns, given in the general's name. Tim had been starting to hope—against his better judgment—that the general was going to let the whole thing slide.

"What am I going to do with you, Lieutenant?" General Izmailov sighed rather theatrically. "I have been reading a translation of an up-time book on a French general who had an elegant solution for this situation. He was dealing with a general, not a lieutenant who acted on his own authority. At their base, the situations are quite similar. Bonaparte's elegant solution was to give the general a medal to acknowledge his achievement." There was a short pause but Tim knew he was far from out of the woods.

General Izmailov continued, "Then, to maintain good order and discipline in the army, he had the man shot for disobeying orders." General Izmailov paused again and waited. Tim remained silent.

"What do you think of Bonaparte's solution, Lieutenant? I could have you a medal by sunset."

Tim gulped and hesitated, looking for the right words. "I can't say it appeals to me, sir. But I grant that the solution has a certain, ah, symmetry." He stopped. Tim really wanted, right then, to bring up the political consequences to the general should he find it necessary to execute a member of a family of such political prominence, even a minor member of a cadet branch. He didn't. Maybe it was because it would sound like the threat it was. But no, really it was because Tim understood that while what he had done was the right thing for that battle, it was the wrong thing for the army. He had sat in the Testbed and watched as Colonel Khilkov used his family position to destroy a couple of Russian cavalry regiments. He knew as well as General Izmailov that if word got out, his example would be used to justify every harebrained glory-hound for the next hundred years. Who knew how many people that would kill? Tim had known when he was doing it that it would cost him, but not how much.

"For political reasons I can't use Bonaparte's elegant symmetry. You will get neither the medal nor the firing squad. Those political reasons are only partly to do with your family." General Izmailov gave Tim a sardonic smile. "I will take the credit for your brilliant move and it may save my life when I must explain to the Duma my acquiescence to Colonel Khilkov's less-than-brilliant actions. We will say that it was a contingency plan. You will get a promotion, then you will receive the worst jobs I can come up with for some time to come. You will accept those jobs without complaint! Understand me, Lieutenant. You deserve the medal you will never get, but you also deserve the firing squad that you won't face this time. Don't make the same mistake again."

* * *

Tim was still doing latrine duty when Moscow finally decided to send reinforcements. At which point the magnate's army, which had never had the sanctioning of the Polish crown, retreated. He continued to receive unpleasant assignments for the next six months, much to the irritation of his father. But Tim never complained.

To Be Continued . . .

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Soundings and Sextants, Part Two, Celestial Navigation Methods

Written by Iver P. Cooper



According to Marx's book on the Spanish *flota*, ship's navigators were regarded with scorn and, on many occasions, the denouement to the stranding of a ship's crew was the assassination or execution of the navigator (71). Up-time celestial navigation methods may thus save not just their reputations, but their lives.

Celestial navigation is the determination of one's location on earth by observing the apparent position of one or more celestial objects. Celestial navigation is possible because that apparent position is dependent on the location of the observer. It is complicated because the apparent position is also dependent on the rotation of the earth about its axis, and the revolution of the earth about the Sun, and thus on the passage of time. (For the Moon and the planets, it is also affected by their own motion about the Earth and Sun, respectively.)

Most, but not all, of the up-timer's knowledge of celestial navigation will be gleaned from the encyclopedias. Admiral Simpson, and some of the other navy veterans, will certainly have taken a navigation course at some point during their naval career. And the Ed Board has decreed that there are at least two copies of pre-1995 editions of Bowditch's *American Practical Navigator*.

There are three powerboat owners in Grantville. Chances are reasonably good that they are members of the U.S. Power Squadron. The nearest chapter is the Kanawha River Power Squadron in Charleston, West Virginia, and it offers courses in "Seamanship, Piloting, Advanced Piloting and Celestial Navigation 1 and 2." (wvdnr.gov).

Celestial Latitude and Longitude

The sky looks a bit as though it were painted on the inside of a giant sphere (this is mimicked by a modern planetarium). In fact, Omar Khayyam referred to "that inverted bowl they call the sky." The stars (including the Sun) appear to move across the "celestial sphere" as a result of the rotation of the Earth, and the revolution of the Earth around the Sun. The apparent motion of the Moon and planets is a composite of their true motion, and the apparent motion generated by the Earth. If we want to use the heavenly bodies as guides to navigation, then we need to be able to describe their positions in the sky.

Celestial coordinates are typically given in one of several different ways, depending on who is using them. First, we have to decide the "origin" (math talk for where we imagine we are standing when we measure the positions). The choices are heliocentric (measured from the center of the Sun), geocentric (from the center of the earth), or topocentric (from a point on the earth's surface)

form. The difference between geocentric and topocentric measurements is likely to be noticeable only for the Moon.

Secondly, we need to choose a coordinate system: the plane from which to measure the angular distance up-or-down, and the direction from which to measure the angular distance left-or-right. There are three principal coordinate systems: equatorial, ecliptic and "alt-az."

Equatorial Coordinates. At a planetarium, you could project a grid onto the screen, representing the "lines" of celestial latitude and longitude. In the equatorial system, the plane of reference is the celestial equator: the projection, into the sky, of the terrestrial equator. Likewise, the North Celestial Pole (NCP) is directly above the Earth's North Pole, and the South Celestial Pole below the Earth's South Pole. Celestial latitude, measured from the equator, is called "declination," and is measured in degrees, arc-minutes ($'$), and arc-seconds ($''$).

Just as we needed a terrestrial prime meridian from which to measure terrestrial longitude, we need to arbitrarily fix a location for the celestial prime meridian in order to determine right ascension. In 1950, it was defined as passing through the "first point" in the constellation Aries.

There's no east or west celestial longitude; it is measured either eastward from the first point as 0-24 hours ("right ascension", RA), or westward as 0-360° ("sidereal hour angle"). RA is stated either like declination, or, because of the relationship of longitude to local time, in hours, minutes (m) and seconds (s) (one minute RA is 15' ; one second, 15").

For any celestial object, there will be a point on the earth's surface such that the object would be directly overhead. That's called the "sub-point" (or "geographical point," GP). As the Earth rotates, etc., the GP will move.

Ecliptic Coordinates. Geocentric equatorial coordinates work well for the Sun and the stars, at least in the short term (years as opposed to centuries), but for the planets, it helps to carry out computations in ecliptic coordinates. The earth's orbital plane is called the ecliptic, and a line drawn through the center of the Earth, and perpendicular to the ecliptic, defines the North and South Ecliptic Poles. Depending on what you are trying to compute, you can use geocentric or heliocentric coordinates.

Because of precession (the wobbling of the Earth's axis relative to the plane of the Earth's orbit), the equatorial coordinates of even the Sun and stars changes slowly with time. (One full precession cycle takes about 26,000 years). Celestial North has to be defined on the basis of the orientation of the Earth's axis, relative to its orbit, as of a particular time ("epoch").

Precession causes the NCP to revolve around the North Ecliptic Pole. Thanks to precession, the celestial prime meridian passes through the constellation Pisces.

The Earth's orbit itself is perturbed by the rest of the Solar System, resulting in changes in the orientation of the major axis and the orbital plane relative to the rest of what I will loosely call "Distant Outer Space." These changes are just too small and too slow to worry about here.

Horizontal (Alt-Az) Coordinates. A navigator's observation of a celestial object isn't likely to be recorded, initially, in equatorial coordinates, but rather in terms of the object's altitude and azimuth. The altitude is the vertical angle between it and the "celestial horizon," which in turn is a distant imaginary circle, centered on the observer and level with the observer's eye, and in a plane perpendicular to the zenith line (from the observer to the point directly overhead, opposite the direction of gravity). The azimuth is its horizontal direction, an angle measured from the direction which points to the North Geographic Pole. The imaginary semicircle running across the sky from north to south is the observer's meridian.

Alt-Az coordinates are relative to an observer on the earth's surface, and thus are topocentric. After correcting for observational errors, they can be converted into other coordinates.

Sources of Error in Celestial Navigation

There are several kinds of error which can occur. The first are observational errors, wherein the "read" position, in alt-az coordinates, doesn't correspond to the actual position of the object at that time. Or there is an error in determining the time at which the observation was made.



Secondly, there can be an error in the prediction of the celestial coordinates. If the navigator is using a published star atlas or catalogue, then this could be an error on the part of whoever computed the published coordinates, or on the part of the navigator, in taking the value from the table, and perhaps in updating it as needed.

Finally, there can be a sight reduction error, that is, an error in the use of the observation and the reference data to compute the latitude and longitude of the ship.

It does no good to worry about computing star positions to the correct milli-arc second if your observational instrument is only accurate to the nearest degree. Hence, in improving the art of navigation, you need to tackle sources of error in their order of importance. Nunez' *Defense of the Sea Chart* (1537) said that there was no point in correcting for the meridian of observation, in using solar declination tables, unless the longitude difference was at least six hours, because of the grosser errors resulting from the imprecision with which the astrolabe measured altitude. (Taylor 181).

I am going to ignore sources of error which are always smaller than 1'. Usually those mean an error of about a mile on the ground, but if you are using the "lunar distance" method to measure longitude, a 1' error in lunar distance corresponds to a 0.5° error (up to 35 miles) in longitude.

Up-time Computer Software

It isn't likely that there is any navigation software in landlubberly Grantville. However, the high school science department is reported to have at least one astronomy program, and those have data useful in celestial navigation.

There were many amateur astronomy programs available in late 1999/early 2000, but the ones I think most likely to have been acquired for educational purposes are:

- Distant Suns 5.1 (3/2000)
- Deep Space 5.56 (by 1998)
- Dance of the Planets QED edition (1994)
- Red Shift 3 (1998)
- Starry Nights Deluxe 2.0 (by 1999) or Pro (1/2000)

TheSky v.4 (by early 2000)

Voyager 2 (by 1999)

DeepSky 2000 (1/2000)

Canon says that Johnnie Farrell has a telescope with a "goto." A certain amount of astronomical data could be extracted, somewhat laboriously, from the "goto."

Star Data

If we know the locations of the stars in ecliptic or equatorial coordinates, we can use them for navigation. There are three possible sources of this information:

—down-time star catalogs (including atlases and globes), corrected for the passage of time

—up-time star catalogs (books and software), ditto

—post-RoF observations

Down-time Star Data. The most useful compilation is the star catalogue of Tycho Brahe. His "cat D" (1598) provides ecliptic coordinates (nearest 0.5') for 1004 stars. Tycho was well aware of precession (see below) and, since the catalog was the fruit of years of observation, all star positions were corrected to what they should be for epoch "1601.03".

Tycho's accuracy is excellent. Rawlins compared Tycho's positions to those predicted by combining the Yale Catalog (1982) with "Newcomb's traditional precession constants" (see "Precession" below). For his 100 "select stars" (the bright stars likely to serve as navigational beacons), the error in either equatorial coordinate was *never* as much as 6'. The mean error was 1.62' in RA and 1.48' in declination.

The greatest weakness of Tycho's data is that his observatory was in Denmark, and hence his coverage of southern hemisphere stars is poor.

Up-time Star Data. Books for amateur astronomers will explain how to locate stars (and other celestial objects). Ideally, they will specify the location of the star in celestial equatorial coordinates (right ascension and declination) and also state the standard date for which those coordinates were determined.

Pasachoff, *Stars and Planets* was in the Mannington Middle School Library. The 2000 edition came out in 1999. Appendix 2 gives the calculated mid-1999 equatorial coordinates (to nearest 0.1') for the 314 brightest stars (down to apparent magnitude 3.55), each identified by its name as given in Bayer's 1603 atlas. There is also a copy of *Burnham's Celestial Handbook* in the high school science department.

The mysterious computer program should have star data specified at least to the nearest arc-minute (as with TellStar, 1985) and more likely to the arc-second (as in *Dance of the Planets*, 1994).

Precession. The modern star positions, and even those of Tycho's, are not quite accurate in the 1630s. The discrepancies are primarily the result of precession. *Encyclopedia Americana* "Equinox" says that the cycle is about 26,000 years, and that precession is at a rate of about 50 arc-seconds/year (which implies a cycle length of 25,920 years). EB11 ("Precession of the Equinoxes", "Earth") gives two values for "general precession", 50.2453 (1850) and 50.2564 (1900) arc-seconds/year.

Both the down-time and up-time star data can be roughly corrected for precession, by any competent down-time astronomer, by assuming that precession occurs at the constant rate suggested by EB11, and then carrying out the appropriate spherical trigonometry calculation. Tycho and Kepler both corrected older data; the value used by Tycho was 51" (Rawlins 17.)

That astronomy program should be able to precess the modern star positions back to the 1630s and the underlying algorithm is probably more complex (and accurate) than the simple constant precession contemplated by Tycho .

Proper Motion. For some navigational stars (Rigel Kent, Arcturus, Polaris, Zuben-ubi) proper motion (the real motion of the star relative to the solar system) can create a noticeable error (Reis). Obviously, the stars will experience more than ten times as much proper motion in the nearly four centuries separating Pasachoff from the 1630s, as in the three decades elapsed since Tycho's catalog. The astronomy programs may take proper motion into account.

Recommendations. Assuming, as is likely, that the available software gives star positions with better than the Tychonian arc-minute accuracy, and supports precession to the 1630s, we will probably use the software to read off the correct 163x equatorial coordinates for all the navigational stars. Otherwise, we will probably use Pasachoff's data for southern hemisphere stars and Tycho's for the rest, with both adjusted for precession.

In the long-term, astronomers will use telescopes to obtain star positions which are both current and accurate. One of the first catalogs compiled with telescopic assistance, Flamsteed's, was accurate to 10" arc (Wakefield 51).

Astronomical and Nautical Almanacs (Ephemerides)

An ephemeris is an almanac which tabulates the positions of an astronomical object as of different times. The difference between the

nautical and astronomical almanac is one of emphasis. A modern nautical almanac will list predictions only for the Sun, Moon, and the "navigational" planets, and a stellar reference point, the constellation Ares. It will also identify the locations of the navigational stars (57 nowadays) relative to Ares. An astronomical almanac will cover the other planets and moons, and will provide coordinates for many additional stars. In either case, the solar, lunar and planetary predictions are usually good only for a few years, unless you have a computerized version.

Some internet sources would have you believe that the first nautical almanac was published in 1767. That was merely the first one with "lunar tables" for calculating longitude. The 1545 almanac of Martin Cortes was a long term (1545-1580) almanac, in which the solar declination was calculated by combining values for the month/day, and the year, to obtain the zodiacal position of the sun, and that then used to find the actual declination. In contrast, the almanac of William Bourne (1576) featured a simple look up, but was useable for a much shorter period. A more recent almanac was Davis's *Seaman's Secrets* (1594). It provided a table of the sun's declination for noon each day for the years 1593-97. (Graham; EB11/Navigation). The down-timers actually could do better than that; Digges' *Prognostications* (1553) had a table of the sun's altitude for every hour of the day at latitude 51.5° N (Taylor 187). Some of the down-time almanacs also had star data; *Mariner's Mirror* (1588) offered the declination and right ascension coordinates for 100 "fixed stars" (Taylor 209).

A modern nautical almanac provides the declination and the Greenwich Hour Angle (GHA), to nearest 0.1', for each celestial object useful in navigation. The GHA is essentially the angle between the celestial meridian of the object, and the celestial meridian over Greenwich. Values are given for every hour (Greenwich Mean Time, GMT) of every day for the Sun, Moon, and planets, and for every day for the first point of Aries. To get the GHA for a particular star, you add the star's SHA. (GHA changes 1°/day for the stars, because, thanks to the earth's orbital movement, the earth doesn't have to quite complete a full rotation to face the same star a second night.) There is a correction value given, for each day, for the Sun and planets, to allow for interpolation between whole hours. And the Moon's movement is so irregular that a separate correction value is given for each hour.

The major concern with regard to the down-time manuals is accuracy. For example, for July 23, 1579, when Drake left the California coast, Bourne's declination tables (1574) were in error by six arc-minutes (Graham). The problem was that Bourne, not knowing Kepler's laws of planetary motion, had miscalculated the apparent solar movements.

While that was a "model error," computational errors were common. According to Bowditch, Tables 1 and 2 of Moore's *Practical Navigator* (1800) had 3,500 errors. And Astronomer-Royal Maskelyne's "Requisite Tables" were equally faulty, with 1,024 mistakes in Table 21. (Callaghan 215). The safest course of action is clearly to generate the numbers, and print the manuals, by computer.

Errors can also occur in using tables. Unlike a computer program, a table can't give celestial positions for every location at any instant of the day. If the observation isn't for the location and time of day assumed by the table, then for greatest accuracy, you must interpolate between table values. Errors could be made in interpolation, or the seamen could decide not to bother interpolating at all. Solar declination tables, for example, were calculated as of the local time at a particular location. If the ship were at a different longitude, then its local time was different, and the navigator should make a longitude correction before using the declination, as taught by Hariot. Wright (1599) said that by ignoring longitude, the mariner might be "deceived sometimes 10 or 12 [arc] minutes in taking the sun's declination. Drake, in circumnavigating the world, ignored the problem. (Graham)

It is worth noting that seamen made calculations using the abacus (Swanick 42) and Gunter's line, sector and scale (basically devices for graphical solution of trig and log problems).

* * *

Solar Positions. The apparent motion of the Sun is a direct consequence of the real orbital motion of the Earth. There is a systematic error in many seventeenth century predictions of the Sun (and hence of the planets) because of Tycho's erroneous value (0.018) for the eccentricity of the Earth's orbit. (Gingerich xix). Cassini (1667) recalculated it as 0.017. Dutton-Smith says that it was 0.01675104 in 1900, and, using his formulae (86), when Grantville popped into the seventeenth century (May 25, 1631, Gregorian), it was 0.016862.

Planetary Positions. The apparent motion of a planet results from the combination of the real motions of that planet and the Earth. The only planets used for navigation are Venus, Mars, Jupiter and Saturn. Their advantage is that they are bright; their disadvantage, it is more difficult to predict their position than that of the "fixed" stars.

Before the up-timers arrived, down-timers predicted planetary appearances using the solar system models of Ptolemy, Copernicus, Tycho, or Kepler.

Kepler, for example, predicted planetary positions through 1637 in the Rudolphine Tables (1627). These predicted planetary positions through 1637. Lorenz Eichstadt (1596-1660) produced sequels in 1634, 1637, and 1639.

Kepler's Rudolphine Tables competed with the 1632 ephemeris of the Copernican Philip van Lansberge (1561-1632) and the 1622 *Astronomia Danica* of the "Tychonian" Christen Longomontanus (1562-1647).

Andrea Argoli (1570-1657) based his 1621 ephemeris on pure Copernican theory (adjusted circular heliocentric orbits). In 1634 he published new tables which followed the "Tychonian" model (all planets except the Earth circularly orbit the Sun). Argoli's

predictions for Mars (1650s) were within 10' arc. His accuracy was less for other planets: Saturn (~40'), Jupiter (30'), Venus (2°), and Mercury (9°). For the "Sun", it was 8'. (Gingerich xi-xx).

It is perhaps worth mentioning that several later ephemerides authors are alive as of the RoF, including Ismael Boulliau (1605-1694), Noel Durret (1590-1650), Jeremiah Horrocks (1618-1641), and Thomas Streete (1622-1689). They may play a role in post-RoF astronomy.

Down-time mathematician-astronomers are going to learn some very important lessons from the up-timers and their books:

- (1) Kepler was on the right track; the planets are, to a first approximation, in elliptical orbits with the Sun at one focus (his first law), they don't move at a constant velocity (his second law), and the periods are related to the size of the orbits (his third law);
- (2) the Keplerian laws aren't really laws, they are a corollary to a special case of the real law governing planetary motion—Newton's law of universal gravitation. (Kepler's laws can be derived if one assumes that there are just two bodies in the universe and one is much more massive than the other.)
- (3) the other bodies "perturb" the orbit of interest, changing (usually slowly) its orbital elements (size, ellipticity, orientation).
- (4) there is no exact solution to the N-body problem, but a pragmatic solution is obtainable by approximation methods.

With this information, they can make reasonably accurate short-term predictions of the movements of the planets even without up-time data.

In fact, with just the Keplerian laws, Kepler successfully predicted (in 1627) the transit of Mercury in 1631. The theory of gravitation, in its turn, made it possible for Edmund Halley to recognize that the comet seen in 1682 had previously been observed in 1531 and 1607, and that it would return in 1758.

A planetary orbit is defined by five orbital elements (and a sixth indicates where the planet is in that orbit). Two describe the orbital geometry and the other three the orientation in three dimensions relative to Earth's orbit. EB11/Planets provides all of the orbital elements for the planets as of 1900/10. Pasachoff (Appendix 9) provides the masses of the Sun and planets, and three of the orbital elements (semimajor axis, eccentricity, and inclination), as of 2000. There are differences; e.g., Mars' eccentricity is 0.093309 (EB11) or 0.09341 (Pasachoff). Kepler's value was 0.09265 (Murray 20).

The six elements necessary to specify an elliptical orbit can be determined from three observations. However, there are many different routes of getting from the observational data to the orbital elements, and they vary in terms of accuracy and computation time. Historically, the major post-Newtonian contributions to orbit determination were those of Euler (1744), Lambert (1761-71), Lagrange (1778), Laplace (1780), Olbers (1797), and Gauss (1809)(Dubiago 7-14). The point to note is that some very heavy hitters studied the problem and that it still took over a century to get from Newton's *Principia* (1687) to the Gaussian method.

The observations need to be far enough apart so as to "see" the orbit from significantly different perspectives, but close enough together so that the elements haven't had time to be significantly perturbed. Once the elements are known, you can use additional observations to try to figure out how that orbit is being perturbed. Then you can calculate a more definitive present orbit, and that in turn allows you to later detect smaller or less frequent perturbations.

The basic concept of perturbation is one familiar to seventeenth century mathematicians; the epicycles engrafted on the Ptolemaic (and Copernican) models of the solar system perturbed the basic "circular" orbits of the planet in such a way as to account for discordant observations.

However, perturbation theory is an advanced topic in mathematics and it is by no means clear that the mathematicians of Grantville can teach it. It will need to be rediscovered. Once that happens, what you end up with is that each orbital element, instead of being constant as in the Keplerian model, is a complicated function of time. This is called an "analytical model."

In theory, if you know the masses, positions and velocities of all significant bodies in the solar system at the same point in time, you can instead use "numerical integration" to determine their positions and velocities in the past and in the future. In essence, you calculate the gravitational forces on each object, and determine how their positions and velocities change over a small time interval. Then you calculate the forces acting over the next time interval, and so on.

This wasn't feasible until high-speed computers were developed.

In practice, you are combining observational data, of varying reliability, from different dates. So the initial state for the simulation is determined using an analytical model. The simulation is run, generating an ephemeris for a period for which observations exist. The initial state is tweaked until the predicted ephemeris is a "best fit" to the observations. The simulation can be extended to make predictions concerning the past and future perambulations of the bodies.



The accuracy of the predictions will depend on the accuracy of the starting data, and on use of a sufficiently small time step. The smaller the interval, of course, the more computation is necessary.

There were some pre-RoF amateur astronomy programs, such as *Dance of the Planets*, which had some numerical integration capability.

Among professionals, the trend has been to use numerical integration to generate a "background ephemeris," and then find the analytical expressions which best fit the data. As of the RoF, the "gold standard" for the planets was the VSOP87 "semi-analytical" model, in which analytical (polynomial and trigonometric) expressions were fitted to the DE200 ephemeris (covering 1600-2169) generated by numerical integration. VSOP87 is believed to be accurate to 0.05 arc second for the modern period and to one arc second over a period of several thousand years. Unfortunately, it also contains *thousands* of correction terms for each planet (Bretagnon, Table 6). Amateur astronomy programs typically use, at best, a simplified version of VSOP87.

Lunar Positions. The Moon's orbit about Earth is only approximately elliptical, because of the effect of the Sun, the Earth's equatorial bulge, the planets, etc. It is thus incredibly difficult to predict.

The average lunar motion is about 30'/hour, but three anomalies (eccentricity, evection and variation) were known to the down-timers. In theory, those are enough to predict the lunar position with an accuracy of about 10' (Fitzpatrick).

Flamsteed thought that the lunar theory of 1683 was capable of predicting lunar position with an accuracy of at most 12', and Kollerstrom believes that Newton's 1702 theory was accurate to 7-8'. The theoretical accuracy would be degraded by computation errors. For example, in 1695-1701, a French almanac had lunar longitude errors in 1695-1701 which sometimes exceeded 30'. (Kollerstrom; cp. Williams 79).

The "gold standard" for the Moon is the "semi-analytical" ELP2000. It is accurate to 1.5" for 1900-2100 and 20" for 1500-2500 (Giesen). Amateur astronomy software would probably use a truncated version with arc-minute accuracy.

* * *

The computation of astronomical tables by hand calculations is laborious and error-prone. The process of constructing almanacs would be simplified by amateur astronomy software.

The marketing appeal of these programs often resided in their graphical representations of the sky. But what we want is a program which can print an ephemeris, showing either, for a particular day, the positions of the sun, moon, and planets, or, for a series of days, the positions of a single celestial object.

Secondly, the program must allow the user to specify a date in the 1630s. *Starry Night Deluxe*, for example, allowed an earliest date of 4713 BC.

Finally, the program must provide accurate results for seventeenth century dates. But we don't need VSOP87. If the software correctly implements the algorithms published by Meeus' *Astronomical Algorithms* (a popular source), it will be accurate for planetary positions in the 1630s to within an arc-second (ProjectPluto.com), which for us is overkill. An NOAA reviewer (Code) said

that Voyager II had "planet calculations good to a couple of seconds of arc over 500 years" and implied that it still was not as accurate as Red Shift or Starry Night.

The moon is more of a problem; Meeus only provides about ten arc-second accuracy even for modern times, which, for calculating longitude by lunar distance (see below), will result in longitude errors of about 5'.

If the software becomes unusable (e.g., the disk is copy-protected and becomes unreadable), then we have to compute the tables ourselves. We can use Kepler's orbital elements, the "up-time" elements, or elements determined by new post-RoF observations. New computer programs (or spreadsheets) can be written, both to derive elements from observations, and to produce ephemerides from the elements.

* * *

For some years after RoF, only Grantville and a few other towns in Europe will have computers and thus those places will produce most ephemerides. The output will probably be to dot matrix printers, which is considered to be a sustainable technology, in order to avoid the transcription errors associated with typesetting.

Navigational Use of the Pole Star

In the northern hemisphere, observation of the Pole Star, Polaris, allows you to determine your latitude, as well as the direction of True North (as distinguished from Compass North). Of course, it is important that you know your constellations. "Columbus's celestial navigation was almost invariably unfortunate, a litany of wildly wrong latitudes caused by his mistaking other stars for Polaris." (Phillip-Birt 178)

If Polaris were in fact located at the NCP, then altitude of Polaris would be your latitude, and its bearing would be the direction of True North. Petrus Peregrinus' *Epistola de Magnete* (1269) recognized that Polaris moved in a small circle about the north celestial pole. (Polaris is now less than 1° from the NCP. In 1601, Polaris was at 87°08.7' declination, 5°56.6' RA—about 3° from NCP (Rawlins 99-S2). Wright (1599) said that the distance was 2d52' (Graham).)

The *Regimento do astrolabio e do quadrante* (Lisbon, 1510) evidences that down-timers know how to use the "rule of the north"—based on the orientation of the "guard stars" alpha and beta Ursa Minor—to find the latitude from the altitude of Polaris. If they formed a vertical line, then Polaris was at the same altitude as the celestial north, and no correction was necessary. If they were horizontal, then you had to add or subtract several degrees, depending on whether they pointed west or east. (Taylor 146).

Determining Latitude

Polestar Altitude. I have already alluded to use of the Pole Star to find latitude. That doesn't work in the daytime, or in the southern hemisphere.

Meridian Sight. The second method requires observing the altitude of a celestial object when it crosses the observer's meridian. For the sun, this will occur at local noon. (A circumpolar star will cross the meridian twice a day, and the crossings are upper and lower culmination.) Knowing the declination of the sun for the date in question, simple arithmetic yields the latitude.

Of course, that requires both an almanac with a declination table, and the ability to recognize when local noon has arrived. The sun ascends during the morning, and descends during the afternoon. Local noon is the moment at which the solar disk seems to hang motionless in the sky.

Obviously, if you don't measure the altitude at, precisely, local noon, the computed latitude will be in error. However, at moderate latitudes, around local noon the trajectory of the Sun is fairly flat, i.e., its altitude doesn't change rapidly. For 40°N, the maximum change of altitude is 0.1' at 2 min before or after local apparent noon, 0.6' at 4 min. Sail up to 80°N, and the altitude changes are 0.4' and 6', respectively. (Mixer 317)

Double Altitude. Sometimes the weather doesn't permit a meridian sighting of the sun. If you make two successive observations, and you know the time interval between them, and the sun's declination (almanac), you can calculate the latitude without bothering to observe the sun at local noon. For this purpose, the watch doesn't need to keep accurate time over the long term; it just needs to be able to measure a time interval of an hour or two. The measurements should be close to when the object reaches the meridian, and the procedure is more prone to error when the meridian crossing is high in the sky. (Bowditch/1826, 128) A complication is that the first altitude must be corrected for the estimated movement of the ship.

Ex-Meridian Altitude. The weather may be so bad that you can only make one sighting, but close to noon. You can still compute the latitude from the altitude, albeit less reliably. The first item you need is a well-regulated watch; one which keeps good time and which was recently set (perhaps the preceding morning), based on celestial observations, to the local time. The second is an estimated latitude (Bowditch) or longitude. And you need almanac information.

Equal Altitude. This is a special case of the double altitude method. You take a timed morning sighting, and then, in the afternoon,

time when the Sun drops back to the same altitude. (You keep the sextant set at the original altitude and let the Sun swim into view.) The time midway between, suitably adjusted, is considered the time of local noon. (Williams 111). Polter (1605) objected to the use of equal altitudes because the declination changes between readings, even though the change is only 1'/hour, at most (Taylor 218). If the Sun is hidden all day, or poorly located for use of the double altitude method, one may instead observe a star (if there is a visible horizon), a planet, or the Moon, but the latter changes its celestial position rapidly, and this poses computational complications.

Accuracy. Drake's accuracy (1579) was about 9' for measurements on shore and 21' for those at sea (DNG).

Determining Longitude

All methods of determining longitude require comparing local time with the simultaneous time at a reference meridian (e.g., Greenwich). The difference in time, multiplied by 15°, yields the difference in longitude.

No celestial object hovers over a single point of the Earth's surface (although Polaris comes close). During the course of a day, as a result of the Earth's rotation, the GP of a star traces a circle on the Earth's surface. That circle is at a fixed latitude (determined by the declination of the star) but the longitude of the GP can only be determined if you know the local time. And you need to know the longitude of the GP if you want to calculate the longitude of the ship.

Local time. The simplest way, in theory, to know the local time of an observation is to carry it out when the sun has hung in the sky (reached meridian altitude), which is, approximately, local noon. A watch time can be corrected, after the fact, to local time by using the equal altitude method (see "determining latitude" above) to determine the watch time at which local noon occurred. (Preston 172) At sea, it was more common to shoot the Sun when it was bearing east or west and use its altitude, together with computed latitude and estimated longitude, and the Sun's declination, to calculate the time of observation (Bowditch 155). Star positions can also be used to estimate a local time.

If local noon is determined by a sighting, the time since noon can be tracked by means of an hourglass or, better yet, a simple timepiece. (Even a timepiece that was not suitable for keeping accurate time over the length of a voyage might be reasonably accurate over the hours between a noon-sight and a twilight-sight.) And at night, local time could be determined to perhaps the nearest quarter-hour using a "nocturnal" (see part 1).

Reference time. The reference time may be determined either by observing some celestial event (which happens essentially simultaneously for both the reference observatory and the ship's location), or by inspection of a chronometer set previously to the reference and which has kept "consistent" time (it loses or gains time in a predictable manner) since then.

The celestial events which have been used for longitude determinations include jovian moon eclipses, lunar eclipses, lunar occultations, and particular angular separations of the moon from the Sun or stars.

Jovian Moon Method. In theory, a reference time could be determined by noting when the moons of Jupiter passed into or out of its shadow, and comparing it to the times stated in an ephemeris computed for a location of known longitude. When a predicted immersion or emersion was observed, a clock was set to the ephemeris time. The next day, the observer noted the clock time at which the sun peaked (local noon). You then calculated the longitude, hoping that in the course of a day, the clock hopefully wouldn't lose or gain too much time from the true reference time.

The ephemeris for Paris was calculated by Cassini in 1668 and by 1696 Cassini published a map of the world which used longitudes determined by this method. Unfortunately, the method was impractical on shipboard. The necessary telescope (15-20 feet long) had a narrow field of view, so it would be difficult to keep the moons under observation while the ship pitched and rolled. If you were using a pendulum clock, then there was the further problem that the clock wouldn't work properly, even over the relatively short time interval between the two necessary observations. The experienced astronomer Halley tried, but concluded that the Jovian eclipses were "absolutely unfit at sea" (Mentzer; Wakefield 86-7).

Just as well. Cassini's tables were in substantial error because he failed to consider the effect of the finite speed of light (discovered by Roemer, 1676) on the time of observation of Jovian eclipses (Wakefield 164).

Lunar eclipse. A lunar eclipse occurs when the Moon passes through the Earth's shadow. It is observable from anywhere on the night hemisphere, and begins and ends at the same time for all observers. If you have an almanac giving the time the eclipse begins or ends for a reference site of known longitude, you can compare that reference time to the local time. Unfortunately, lunar eclipses occur only a few times a year, are difficult to time, and in practice yield an accuracy of only perhaps 0.5-1.5° (Espenak; Oliver).

Lunar occultation. The moon takes about 29.5 days (its synodic period) to travel 360° in celestial longitude, so its change in celestial longitude is about half a degree per hour. In contrast, the stars have essentially fixed celestial longitudes. Hence, the movement of the moon, relative to the stars, could be used to judge the reference time.

Initially, it was proposed that astronomers predict the times that the moon would "occlude" (pass in front of) various stars. Unfortunately, while we think of the moon as large, its angular size is half a degree—that of a penny held 2.29 meters away. On a

ship at sea, you are normally going to be able to identify the brighter stars, and the odds are not great that, on a particular night, one of these will be occulted by the moon.

Lunar Distance ("Lunars"). Hence, astronomers instead predicted the "lunar distance," the angular distance between the moon and a celestial reference point (a star or the Sun), for different hours of the day, day after day. (Although the Sun moves against the sky, its celestial longitude can be predicted with accuracy.)

The lunar distance method was proposed by Regiomontanus (1475) and Werner (1514), but it wasn't seriously pursued until the 1700s. There are several methods of calculating the "lunar distance", with different tradeoffs between accuracy and speed; Bowditch's 1802 method was the first one considered practical by mariners. While we expect to find copies of "Bowditch" in Grantville, it is unlikely that we will find an edition which contains either the original lunar distance methods (dropped in 1880) or the replacement method (dropped from the Appendix in 1914).

Although the rapid movement of the Moon makes it a potentially useable celestial clock, it was a somewhat frustrating one in practice. All errors in observation, prediction and computation are multiplied by the ratio of the earth's rate of rotation ($15^\circ/\text{hour}$) to the rate of change in lunar longitude ($\sim 0.5^\circ/\text{hour}$): 29.5.

Lunars were difficult from an observational standpoint. Normally, a sextant is held vertically, and used to measure altitude above the horizon. For lunars, it had to be held obliquely, depending on where the Moon and the reference object were located.

The observed angle would be affected, like any other sighting, by dip and refraction. However, to correct the lunar distance, you needed to know the altitudes of the Moon and its "partner." So that meant, ideally, taking three simultaneous sextant measurements: the two altitudes, and the lunar distance. That was usually impractical, so what was done instead was to 1) measure the altitudes of both objects, 2) then the lunar distance, and 3) the altitudes again. The "before" and "after" altitudes for each object were averaged together to estimate the altitudes at the time of the lunar distance measurement.

Then you had to apply the tables. Their accuracy depended on the astronomers' understanding of lunar movements. Predicting lunar position is complicated because the moon's orbit is strongly perturbed by the Sun, so it can't be calculated purely by Keplerian methods. In the 1783 Nautical Almanac, the average error was 14" in ecliptic latitude and 30" in longitude. In 1817, the average latitude and longitude errors were 5". (Williams 96)

Then the ship's longitude had to be computed correctly. In practice, "longitude by chronometer" (see below) was perhaps ten times more accurate than "longitude by lunar distance," because the lunar observations and calculations were so complex and prone to error (Sobel 162). Preston (180) says that in the early nineteenth century, it was not unusual for lunars to yield a 30' error in the longitude. Lewis and Clark used the lunar distance method, and their errors in longitude were as great as 185' for moon-star and 76' for moon-sun measurements (185).

Chronometers. In 1530, Gemma Frisius pointed out that if one had a good clock, one could set it according to the time at a location of known longitude. Multiplying the time difference in hours between the reference clock time when the sun peaked (local noon), and noon, by 15 then gave the longitude difference in degrees from the known longitude.



An alternative to reading the chronometer time at local noon is to take two readings, one before noon and one after, when the sun is at the same altitude. The time of local noon is then the average of the two equal altitude times (Schlereth 96; Preston 172).

Practical use of this method had to await the development of a ship-friendly clock.

The down-time clocks have a cumulative error of 10-15 minutes/day. "After a few weeks at sea, clock error could correspond to a longitude error as wide as the ocean." (William 78; Mixter, 271; Wakefield 136).

The first reliable marine chronometer was designed and built by Harrison in the late eighteenth century. His H-4 (1760), lost only five seconds after 81 days at sea. After another two months, its temperature-adjusted total error was still under two minutes (Sobel 120-1).

The Harrison chronometer's principal weakness was the time and expense necessary to build it. The copy of H-4 made by Kendall (1770) cost 500 pounds, and took two years to construct. Kendall told the Board of Longitude, "I am of the opinion that it would be many years (if ever) before a watch of the same kind . . . could be afforded for 200 pounds." (200 pounds in 1776 was equivalent in buying power to 150 pounds in 1632; enough to buy a large yacht of 25-35 tons burden.) In contrast, a sextant and a set of lunar distance tables would cost a mere 20 pounds (153).

Later clockmakers nonetheless brought costs down by having the less critical parts made by lesser craftsmen. by the 1780s, you could buy an Arnold box chronometer for 80 pounds, or an Earnshaw for 65. There was also the Arnold pocket chronometer, which only gained or lost three seconds a day. (Sobel 156-63)

The 1632 Tech Dead Horses page comments, "Yes, we can make a lot of \$ using up-time clocks, and no, no one is going to recreate Harrison's clock, it's way simpler to copy something newer. And people will." And that's where I am going to leave it. This is an article on navigation, not horology.

It is not necessary that the clock keep perfect time. What is necessary is that its error, if any, be known and predictable. A modern chronometer is set, in port, to approximate GMT, and certified as to its initial departure from GMT it is, the average rate at which it gains or loses time, and the date of the time check. (Mixter 272)

Most of my sources emphasized how much more difficult it was to determine longitude at sea than on land. However, maritime travel did have the advantage of being fast; an Atlantic crossing was something like two months by sail, less by steam. Hence, the chronometer's time error—especially the unpredictable error—wouldn't have the chance to accumulate to unbearable levels before you reached a port of known longitude, and could re-calibrate it. However, the Lewis and Clark expedition (1803-6) took years, and its rigors, in some respects, were greater than those of a sea passage. Consequently, L&C periodically re-calibrated their chronometer

by the lunar distance method. This revealed considerable rate variation; it lost 15.6 sec/day in the summer 1803, 36 in late November, and 46.44 in mid-December. (Huxtable 1.4)

"Lunars" were only rarely used after 1850, in view of the convenience and accuracy of calculations based on improved chronometers. One use was to verify that the chronometers were still in working order. The Nautical Almanac stopped publishing lunar distances in 1907.

Modern Celestial Cross-Fix

Lines of Position. Earlier celestial navigation methods required making an observation at a special time (e.g., local noon) which simplified the calculations. Latitude and longitude were determined separately. But you can determine both ship's latitude and longitude simultaneously if you know the reference time (per chronometer) and take two (at most three) sextant readings ("time sights") on a celestial object whose position is tabulated in a nautical almanac.

From the almanac and the reference time, you know the GP of the celestial object. The sextant reading defines a circle about the GP, whose radius equals 90° -altitude. If a second mariner simultaneously takes a sextant reading of a second object, you get a second circle, and the ship must be at one of the two intersection points. Usually your dead reckoning from the last known position will tell you which of the two is right, but if it doesn't you can take a reading of a third object to be sure.

If the sextant readings aren't simultaneous, the older reading is "advanced" (moved, based on ship's course and speed) so that they are effectively simultaneous. This is called a "running fix."

It is inconvenient to plot these circles, which are usually very large, on a globe or a chart. Fortunately, a small enough arc of a large circle can be approximated by a straight line, and the position is then where the two "lines of position" (LOPs, Sumner lines) cross. These can be plotted on a large-scale map (EB11/Navigation).

Graphic methods work best when the two LOPs meet at a substantial angle, and the objects can be picked to ensure this. Sun and moon will generate LOPs crossing each other at an angle of 45° or better perhaps ten days a month (Schlereth 77). Or you can pick stars which are in different quadrants of the sky.

As described in EB11, Saint Hilaire suggested (1875) a major improvement in the 1847 Sumner method. This involved using an assumed position to compute an expected altitude and azimuth for the GP, then plotting the LOP perpendicular to the computed azimuth line, moving the LOP toward or away from the assumed position to account for the difference between the expected altitude and the observed (after correction for observational errors) altitude.

The expected altitude and azimuth can be obtained by spherical trigonometry, by solving the navigational triangle (two sightings yields two linked triangles). This is formed by the assumed position (AP), the GP of a sighted celestial object, and the nearest pole (P). For each triangle, we have three sides, whose lengths are:

GP-AP: 90° -expected altitude

GP-P: 90° -object declination (looked up in almanac)

AP-P: 90° -assumed latitude

The angle with vertex at P is the expected difference in longitude (meridian angle) between AP (assumed longitude) and GP (looked up). The angle with vertex at AP is the expected azimuth (or 360° -azimuth) of the GP, if the ship is at the assumed position. The sides AP-P and GP-P, and the meridian angle, are used to calculate the expected altitude and azimuth.

At local noon, the meridian angle becomes zero and the triangle degenerates into a straight line, vastly simplifying computations.

Log and Trig tables. Sight reduction (the conversion of observations to positions) is heavily dependent on knowledge of spherical geometry and trigonometry. Many different formulae were known by the early seventeenth century. Typically, these required multiplication of trigonometric functions. In the sixteenth century, the trigonometric functions of angles had been calculated to fifteen decimal places. Logarithms were important because instead of multiplying trigonometric functions you could just add their logarithms. Napier published logarithmic tables in 1614, and by 1624 they had been computed to fourteen decimal places (Williams 47-54).

Sight Reduction Tables. So sailors don't have to do trigonometric calculations, sight reduction tables have been prepared. They compile precomputed navigation triangles, typically covering each possible whole degree value of the meridian angle, latitude, and declination. Unlike almanacs, these are always valid; the math doesn't change.

To use the tables, you assume a ship position which is at a whole degree latitude and longitude within $30'$ of the dead reckoning position, and calculate the meridian angle from the longitude and the almanac listing of the "hour angle" of the object. The declination is in the almanac. Together with the assumed latitude, you use the SRTs to find the expected altitude (nearest $0.1'$) and azimuth (0.1°) of the object. You then compute the altitude difference and draw the LOP accordingly.

There is no assurance that any sight reduction tables will exist in Grantville. If anyone has them, it is Jesse Wood, since they are also used in aerial navigation. If they don't exist, they can be generated by computer, and printed in volume on dot matrix printers. In fact,

that would probably be better than trying to typeset Jesse's copy, since it would avoid typesetting errors.

Conclusion

Jack London, sailing in the Pacific, noted that every step of the navigational art must be performed correctly, or else the captain will hear, " 'Breakers ahead!' some pleasant night, receive a nice sea-bath, and be given the delightful diversion of fighting the way to shore through a horde of man-eating sharks." The up-timer's mathematical knowledge and mechanical skills will make navigation a bit safer than it was before the Ring of Fire.

The bibliography is included in the Navigation Addendum posted to www.1632.org .

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The Geared Locomotive or What Wood You Shay To?

Written by Kevin H. Evans



Geared locomotives were developed to handle rough track industrial applications. Most notable were logging short lines, and mining short lines. The traditional steam locomotive has cylinders parallel to the ground with the effort of those cylinders transferred to the drive wheels via reciprocating side rods. A geared locomotive transfers the power to the wheels by a shaft connected to the wheels through a gear meshed to another gear on the wheel or axle of the locomotive. Said wheels are usually about the same size as the wheels found on the load carrying cars. Some of these locomotives used power transferred to the center of the axle sets, but the most common type had all the power train (engine, shafts, and gears) mounted on the side of the locomotive.

This type the "Shay" (named after it's inventor, a logger of the same name from Minnesota) had the great advantage that all the working parts were easily accessible and mounted where the Engineer could see them. Additionally the short wheel base of the driven wheel sets (or trucks as they are called) allowed the locomotive to use extremely rough track. In fact the small wheels gave the geared locomotive a lot of adhesion and allowed the movement of large loads for relatively low horse powers. It was commonly said that you could "Draw two lines on the ground and a 'Shay' would follow them." This made it a supremely good locomotive for industrial use. Temporary track, tight turns, and difficult grades were handled with ease. The greatest failing of the geared locomotive was it's slow speed. Because of the gearing a Shay sounds like it is going a hundred miles an hour when it is really making about fifteen miles per hour.

The geared locomotive would also be attractive to the residents of Grantville because a large well run tourist railroad, the "Cass Valley Scenic RR" is only three hours drive from the pre ROF location of Grantville. This operation, formerly a logging road, has what is probably the best collection of geared locomotives in existence. Railroad fans, large machinery enthusiasts, machinery restorationists, and industrial historians would be frequent visitors and would be well aware of the advantages of the geared locomotives in use there.

Building a geared locomotive first would be very attractive because: first, all the "works" are where you can get at them. Second, you can get a lot of work for a lower horsepower prime mover. Third, the locomotive can handle really rough track. Fourth, many of the structural components can be made from wood. Lastly the suspension and equalization of the locomotive is much simpler.

So how they would build it? Well, first it would not look like a product of the 1920s industrial age. It would be coal fired, wood framed, and steam driven. The locomotive would look a lot like a flat car with an engine hanging over the side. Set a boiler on the flat car, wrap the boiler with a saddle type water tank, and add a cab with a fuel bunker on the back.. Lights, bells and whistles would be nice, but secondary to getting the mover on the track..

The first thing to build would be the actual engine. In view of the need for a strong locomotive as quickly as possible, converting a big block "V-eight" engine to steam would have to do. This conversion has problems as the block would have small cylinders compared to a purpose-built engine. It would only have power on the down stroke of those cylinders, and need extensive refitting to run on steam. Luckily, by using an engine block from a big ICE (internal combustion engine) you would have a reciprocating cylinder/piston set without having to do all the design work and machining from scratch.

Converting an engine block to steam can be done in a number of ways, but the easiest is to make it into what is commonly called a bash valve

engine. A bash valve engine, also known to the model aircraft crowd as a CO2 engine, uses a rod mounted to the top of each piston to lift a ball off of it's seat when the piston reaches "Top dead center". This allows steam to enter the cylinder and pushes the piston down. When the piston reaches "Bottom Dead Center" it reveals an exhaust opening that allows the steam to escape. The steam is collected and used to power the draft of the boiler or alternatively condensed to add to the power of the engine and extend the amount of time between water stops.

In order to fit the new valving, the block must be stripped. The valve heads, timing belt, front pulley, and water pumps would all be removed. New valve heads would be fabricated to hold the ball valves and return the lubrication galleries of the block. The block must have an exhaust port cut into each cylinder and have the port fitted with a steam recovery device. Also each piston must be fitted with a push rod for opening the ball valve as needed. Provision must be made so that the engine always rotates the same direction and the existing transmission can be used for forward and reverse. Note that only the forward and reverse gears are needed so second and third gears can be removed if needed or practical.

As for numbers, I am going to fiat the cylinder diameter as 5 inches (I haven't torn down a big block for a long time). Therefore each cylinder will have an area of about 19.6 inches or about 157 square inches total. This, multiplied by the working pressure of the boiler, would give the foot pounds produced by the engine, or about 23,562 foot pounds at 150 psi. This translates into roughly forty-two "steam" horsepower delivered to the transmission.

The use of an automotive transmission would have an effect on the power delivered to the shaft and gearing. While low gears would deliver a lot of power, it would also serve to further limit the top speed of the locomotive. It may be more desirable to keep the forward reverse gearing to a one to one ratio.

The power would be transferred to the wheels via a shaft and bevel gear set. This gear set serves to rotate the motion of the shaft by 90 degrees, and is accomplished by having a pinion gear meshed to a ring gear around the face of the wheel. Each wheel would be driven, and the shafts are usually square tube with telescoping joints to allow motion to the trucks.

The trucks can be made with wooden frames and wheels. The construction would need to be fairly massive, and steel strap reinforcement will be desirable. The wooden wheels would need to be fitted with steel tires and the ring gears could be bolted directly to the wheels. Each truck would also have the shaft and pinion gear mounted to one side. The frames of the trucks would hold the journal boxes, (the bearings that the axles ride on) and would be sprung to a transverse bolster by leaf or coil springs. Also the wheels must be rigidly connected to the axles so as to transfer power to both sides of the truck.

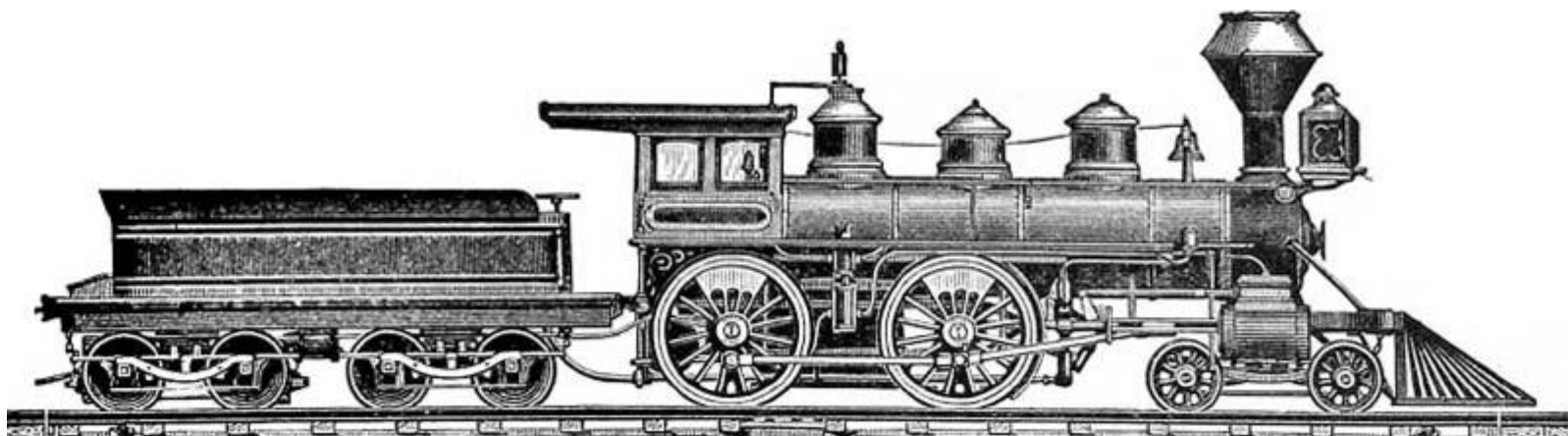
The frame of the locomotive would be made from heavy timber, probably bigger than eight by twelve inch beams fastened by bolts and plates. Cross stringers would be added as needed and it all would be further strengthened by fish plates and tie rods.

The boiler would be offset to the side to allow the mount of the engine at the center edge of one side of the frame. Wrapped around the boiler would be a "Saddle Tank" to provide working water to the boiler and weight to the locomotive for better adhesion to the track. A cab containing a fuel bunker would be mounted to the rear of the boiler and contain the operating controls. The Fireman would be responsible for maintaining enough steam, (adding coal and water to the mix and preventing the boiler from exploding). The Engineer would be responsible for the operation of the locomotive and the safe transportation of the cargo.

Mandatory controls would be: water feed, sight glass, tri-cock water level test ports, safety pop valves, pressure gages, forward reverse lever, throttle control and safety warning devices. Stuff nice to have would be better whistles and bells, lights, cab heat, windows, cutoff control to the steam entering the cylinders, brake controls for the cars, brakes for the locomotive, and an air compressor to feed them.

Construction time would depend on how many workers the builder can throw at the project, materials, and the availability of the machine tooling for the fabrication of the finicky bits.

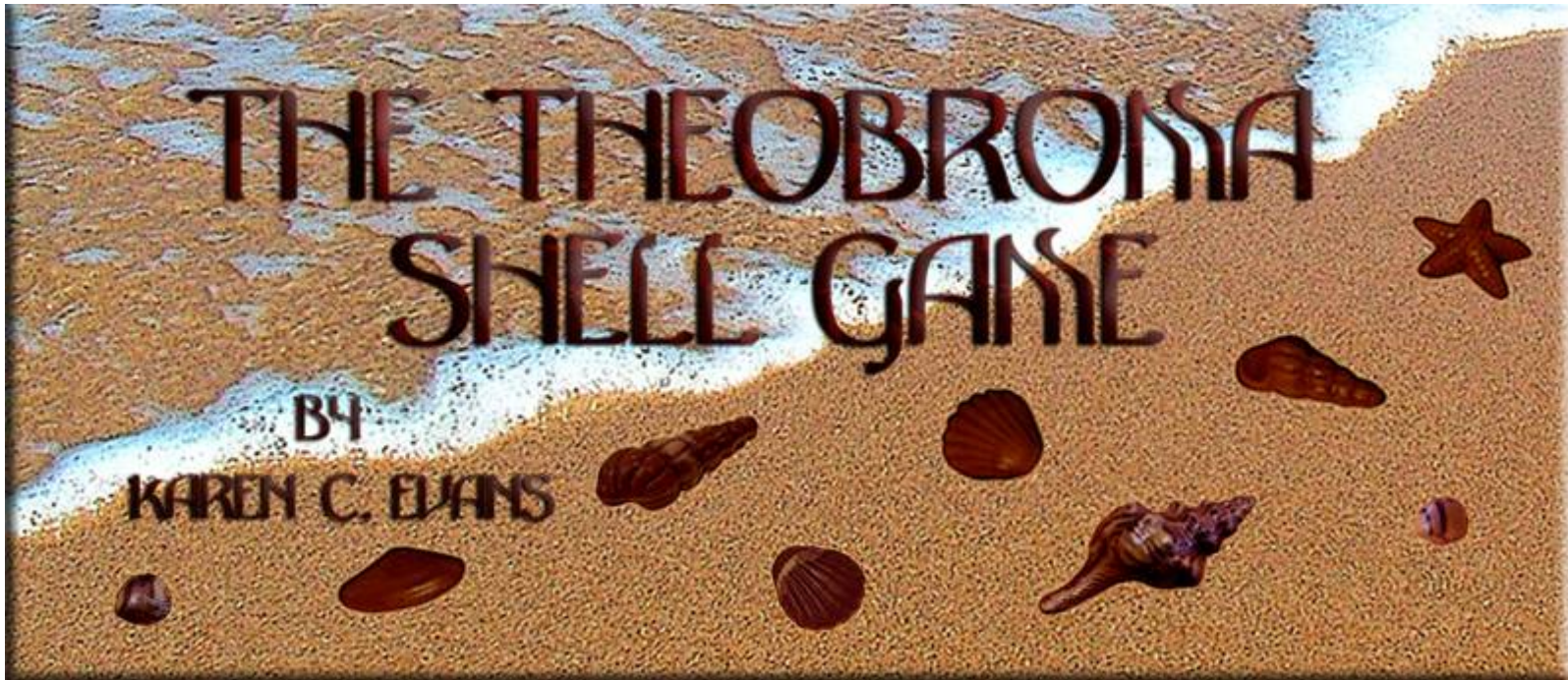
In conclusion, a twenty ton, forty Hp, geared locomotive could probably move ten to fifteen loaded cars over rough track on the level. This capacity will be sorely needed in many industrial applications, especially in places where a lot of materiel must be moved around, like a steel mill or construction of railways. A geared locomotive would get the town a lot of "bang for its buck" and could be upgraded as better materials become available.



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The Theobroma Shell Game

Written by Karen C. Evans



Chocolate, that magical substance that smoothes out the rough parts of our lives. Those of us who have been living with the Grantville "disaster" these past years are reconciled to the fact that we will never have chocolate again. It isn't available in Germany in 1632.

Or is it?

The basic ingredients of the chocolate we know today are sugar, cocoa, vanilla and milk. Of the four, we know that milk is available, at least seasonally.

Sugar

Sugar has been around for a very long time. Prehistorically, the natives in the Malaysian peninsula knew and used the sweet reeds that grew on their islands. Because of the ease in transplanting and splitting the roots, sugar cane became one of mankind's earliest domesticated crops. It took several hundred years for the cane to migrate through Southeast Asia to India. Every place that cane arrived, people tried sticking it into the ground themselves, and a new crop was born.

It may have been when the cane reached India—or it may have been somewhere else—but at some point it was discovered that if you boiled the cane for the juice, you got a thick black syrup. And if you added certain substances such as alkali or ash and then boiled some more, and skimmed the grass-like pieces from the top, crystals would form. Thus, sugar was born.

By about 500 BCE, sugar was well-known in India. The army of Alexander the Great encountered sugar around 325 BCE, and wrote about it in their reports. Some conjecture that this is when Egypt was introduced to the sweet cane, but there is no concrete proof of that.

Sugar as we know it in crystallized forms seems to have been standardized by about 600 AD in Persia. The experts were the Nestorian Christians. Some references claim that sugar cane products to that time were limited to the juice, syrup, and thick molasses, and that it was brought to a solid form by the Nestorians.

Whatever the case, the sugar industry exploded around 600 AD. Sugar was traded throughout the areas of the new religion, Islam. When the Europeans came to the Middle East on crusade, they knew of sugar, which had been traded in small quantities before that time. Now they took a hand in the farming—and more importantly—the processing of sugar. Egypt became a center for production, as did the islands of the Mediterranean.

One of the propagated myths in history is that Marco Polo brought sugar back from China in the thirteenth century, but he comments in his writings about the differences between Chinese sugar production and more familiar Egyptian processes. Sugar came to Europe much earlier than the myth proposes. In 1090, the Normans invaded Sicily, and ownership of sugar production moved firmly into European hands.

In 1494, Columbus took sugar cane from his wife's family in Madeira to the Caribbean. It was much sought after all over Europe.

Apothecaries and pharmacies considered it one of the essential ingredients for their medicines.

I have found two German cookbooks on the internet that have been translated into English, and modern experimentation has begun in each

described receipt to determine what sort of dish is intended. One must remember that, in most cases, cookbooks from the medieval times were a set of notes kept by the head cook of a large household, with instructions for certain dishes. There are no existent recipes for bread, as everyone who made bread already knew the method, and didn't need a recipe. So the dishes in this sort of list are the ones that the cook learned from somewhere else, or the ones written down to remember and use on occasion.

The first book is titled: *Ein Buch von Guter Spise* (A Book of Good Food) [<http://cs-people.bu.edu/akatlas/Buch/recipes.html>] written between 1345 and 1354. There are ninety-six dishes described in it and, by my count, fifteen of them mention sugar, to the sixteen that call for honey. From other sources, it would be easy to see that sugar is expensive and difficult to get in the middle of the fourteenth century.

The second book is called *Sabrina Welserin Cookbook*, from 1553 [http://www.daviddfriedman.com/Medieval/Cookbooks/Sabrina_Welserin.html]. Of the two hundred five listed dishes, eighty-five call for sugar, and only five call for honey.

That means that in the near two hundred years between these two works, both written in German, the ratio of sugar to honey went from almost equal honey to sugar in the 1350s (16:15) to almost no honey mentioned in the 1550s (5:85). Either there was a great dearth of honey in the latter period, or sugar was much more common in 1550.

In 1581, Abraham Ortelius, a Flemish cartographer, would comment that "what used to be kept by the apothecaries for sick people only is now commonly devoured out of gluttony."

The Portuguese were responsible for some of the spread of sugar out of the Mediterranean. They discovered several island groups around the west of Africa; these included Madeira, the Canary islands, and Cape Verde. Sugar cane and sugar production were introduced in all of these tropical locations. When settlements came to Central and South America, so did sugar.

By 1470, sugar refineries were found in the cities of Venice, Bologna, and Antwerp. The European model was for the raw sugar to be minimally processed on the sugar plantations scattered all over the tropics, and then the raw black syrup was transported to Europe for final processing. This way, the West kept control of sugar. By 1496, Madeira was shipping 1700 tons of sugar to Venice, Genoa, Flanders and England. And that was just one production site. It is true that by 1600 Madeira had suffered a sugar blight, and been planted in grapevines for their now-famous wine. But production and demand continued to expand throughout this time period.

It is already canon that sugar is available in Grantville and being traded. In "White Gold" by Kerry Offord (*Grantville Gazette*, Volume 9), sugar was estimated as eighty dollars a pound. The source for his information is from a man named N. W. Posthumus, a scholar of the 1940s. He has tabulated shipments of many kinds to the docks of Amsterdam from 1350 through the late 1700s. Our experts in Grantville canon have decided that the most reliable source we have to date is Posthumus, so we go with the prices he provides, making suitable adjustments for transport and middlemen.

When we start to think about acquiring sugar in Germany during the war, we should first acquaint ourselves with the various grades and costs of sugar, muscovado and molasses. What we think of as normal white sugar was available in this period, but not necessarily in tidy paper bags. It was crystallized and then shipped in loaf shapes. When the cook or homemaker wanted a measured amount of sugar, they would rub the loaf with a sort of rasp. The resulting sugar crystals would be very white and not a consistent size, ranging from a very fine powder to about the size of a pencil lead because of the rasping process.



Other grades of sugar were also available. There were loaves of sugar that were not as thoroughly refined as the top-of-the-line sugar. Possibly referred to as "cooking sugar," these loaves would be less expensive, and also more strong tasting. They would also be less white. What we know today as brown sugar was probably not available, as brown sugar is refined white sugar crystals with molasses added back to give it moisture and flavor. Those who could not afford the crystallized sugar were still able to buy molasses. Molasses was readily available to almost every class of consumer; the darkness of the grade to determined the lower cost.

In the seventeenth century, sugar was one of the largest money-making projects for investors. It was being grown, refined, and sold by the Spanish, Portuguese, Dutch, English, French, Italians, and anyone else who could wedge their way into the business. Sugar was available for different prices depending on the weather, money exchange, and your political relations with whoever was selling. With so many suppliers,

Grantville can shop around for the best deal.

Because of Grantville's connection with the traders in Venice, and its nearness to Amsterdam, it is not only possible, but highly probable that sugar is shipped into town as regularly as coffee. In fact, it may be in more demand and more easily acquired than the mystic black beans.

Vanilla

This very fragrant and mystic substance is not, as some would assume, the "opposite" of chocolate, but it is an essential ingredient in confectionery chocolate. Vanilla is possibly the most pleasant discovery the Europeans found in Central Mexico. The Aztecs, as the dominant tribe of the area, demanded taxes of vanilla from the small tribes that inhabited the jungles of the Yucatan. They also had a whole class of merchants who traveled to the jungles of the south to trade in vanilla and chocolate, and provide it to their noble class. More about them in the section about chocolate.

In 1520, Cortez was well-acquainted with the flavor, smell and availability of vanilla pods. Many of his hired native mercenaries were of the tribes sending tribute to the hated Aztecs.

Vanilla is the ripened seed pod of a particular orchid that was originally found from Southern Mexico down into Guatemala, on the Gulf Coast. The orchids have since been carried around the world and are raised on plantations in all tropical zones. Of the thousands of varieties of orchid that have been classified, not including the numerous hybrids, the vanilla orchid is the only orchid that produces any kind of fruit source for mankind. And of the 150 varieties of vanilla orchid indigenous around the world, the only one that produces the fragrant fruit is that of the Gulf Coast.

The history of vanilla is tightly tied to that of chocolate. It is thought that the Olmecs of Mexico were the first ones to find and use the pods for flavoring. These were the same people to first cultivate cacao, but more on that later. The vanilla was an important ingredient of Atloe, a beverage of Mezzo-America. It consists, even today, of corn masa, water, and vanilla beans. Atoles can be either sweet or savory. There are many variations, either served hot or cold depending on the time of day, and the meal being served.

Vanilla production is a difficult process. The orchid grows on a huge vine that loops up and down trees in the rain forest. And because of the climate, and the size of the vine, the pods do not ripen at the same time. They swell and burst at unexpected moments. If they burst before you can harvest them, you have lost that pod entirely.

Another difficulty with the vanilla flower is that they are very choosy about fertilization. There is a very rare type of bee in the Yucatan that pollinates the vanilla orchids so that the vine can bring the seed pods to fruition. Early entrepreneurs who brought cuttings of the vanilla orchid home to Europe were never successful in actually having vanilla pods appear, even in hot houses in Spain and England. It was some little time before the process was understood, and a method developed to pollinate the flowers for a plantation. Since the flowers appear at dawn and are wilted by the afternoon, growers must maintain constant vigilance for new flowers to pollinate and ripe pods to harvest, in an on-going frantic madhouse.

Even an un-burst vanilla pod does not mean that you have anything of worth. The pod has no detectable scent at all. The curing process can take from six to nine months, and is also very labor-intensive. Because of the intense handwork involved in pollinating and then harvesting the ripe but un-burst pods, then processing them into a fragrant flavoring, vanilla is one of the most labor-intensive products per weight in the known world.

Vanilla first arrived in Europe as a medicinal ingredient. The theory of humors at the time was very prevalent, and all foodstuffs from the New World were thought to be "hot." While it is certain that the chili peppers were definitely hot, and even chocolate could fit into that category, vanilla doesn't seem to fall into the same classification.

There is a great deal of disagreement in various food sources about the availability of vanilla in Germany by the 1630s, and the experts in chocolate do not agree with the experts in vanilla. According to Patricia Rain, known as the Vanilla Queen, as the peoples of Europe experienced this wondrous and fragrant flavoring, the demanded skyrocketed. By 1635 chocolate houses were all the rage in Germany, France, and the Iberian peninsula. And chocolate was very rarely served or consumed without vanilla. Finding vanilla separate from chocolate may be a different problem, though.

Patricia Rain, author of *Vanilla: The Cultural History of the World's Favorite Flavor and Fragrance* wrote:

"It is interesting to note the role that the Jews played in sugar, vanilla and chocolate production. When the Dutch created the Dutch West India Company, they needed colonizers and offered money to those who would come to the Caribbean. Many of the Jews who had fled to Amsterdam in the previous century signed up to travel to the new colonies. Word spread quickly, and Jews from Azores and Italy joined them. They established flourishing sugar plantations near Recife in northern Brazil, only to be forced to leave along with the Dutch twenty years later as the Portuguese gained control of Brazil. They moved to Barbados, Cayenne (now the Republic of Guiana), and Pomeroun (now French Guyana). They were the experts in sugar production, and in growing cacao and vanilla.

"David and Rafael Mercado, the brothers that invented the process and machinery for refining sugar experienced the same jealousy and hatred that Jews were experiencing in Europe. They were denied the right to hold slaves or indentured servants in the Caribbean. As sugar required large numbers of workers, the brothers decided to go to the growth and production of cacao and vanilla. They quickly secured a monopoly in the vanilla trade, sending the much-desired flavor to their merchant friends and families in Europe. This remained the case until 1690 when the French plundered Pomeroun, and the Jewish monopoly came to an end."

So, again, our up-timers in Grantville may have a way to buy vanilla as easily, if not more easily, than coffee. The connections through both

the Jewish commodities and the merchants in Venice indicate that both vanilla and chocolate are not only available, but bought and sold by others in the immediate area.

Chocolate

There are many species of the cacao pod, but only two produce the chocolate that we so crave. The tree known as *Theobroma cacao* is found in tropical rain forests from central Mexico all the way into the Amazon basin. But with this wide spread, it is not surprising that two different species developed in different places.



In Mesoamerica, the cacao trees, known as criollo variant, have long, pointed, warty, soft and deeply ridged pods which contained seed with white cotyledons. That is, the fruit of the criollo is white, containing the seeds. The forastero South American trees grow hard, round, melon-like pods, and the seeds are nestled in purplish cotyledons.

These two trees, and their hybrids provide raw materials for all modern chocolate industry. The criollo possesses flavor and aroma that are absent from the forastero. Why grow the forastero? The criollo trees are susceptible to diseases and rot, and produce few pods. So the forastero is cultivated, as a hardier, heavier producer.

Who in history was the first to find cacao as a valuable food source? We have often been told that it was the Aztecs, but archaeologists today know this is not true. It was not even Cortez who first encountered the cacao pod. Columbus, on his fourth voyage, traded with a Mayan canoe for a cacao pod, and brought it home with him. The Aztecs only knew as much about chocolate as the expert cacao cultivators in southern Mexico and Guatemala told them.

Aztec society had three noble classes. The royals, or ruling families, the priesthood, keeping tight control on the people through fear and human sacrifice, and the merchant class. The major source of income and status for members of the merchant class was in acquiring and trading cacao beans. The rest of Aztec society was either the warriors, who were paid in cacao beans, and the peasants, who raised the rest of the food and did the majority of the work that kept society together.

The Aztecs had a concept of money. They used cacao beans. In fact, they were so concerned about wealth and how many cacao beans they could collect that there were even some very clever counterfeiters that made fake cacao beans. They were very difficult to detect, made of hardened clay and painted meticulously to resemble the real thing.

As the Aztecs moved everything in their trade on foot, the caravans of cacao beans were long strings of men with backpacks. And each backpack contained exactly 24,000 beans.

Much of my information about chocolate comes from *The True History of Chocolate* by Sophie D. Coe and Michael D. Coe. To demonstrate

how wealthy Motecuhzoma (Montezuma) was at the time of Cortez's conquest, we have the account of Pedro de Alvarado, one of the more avaricious of the Spaniards:

One night, when the Aztec ruler was held captive in his own palace, about 300 Indian servants of the Spaniards broke into the storehouse, and worked until sunrise to cart off as much cacao as they could. This came to Alvarado's ears, and he enlisted the aid of one Alonso de Ojeda, who was guarding Motecuhzoma: "When you have turned over your watch and see that it is time, call me, for I also want part of that cacao." They went there with fifty persons, presumably also Indian servants.

Alonso, seeing that it was almost daylight, and they were running out of time, cut the bands of three wicker bins in the warehouse, allowing the cacao beans inside to spill out. His men stuffed their skirts and mantles. Each bin held 600 loads of beans, each load having 24,000 beans. Alvarado and his fellow thieves made off with 43,200,000 beans, and it was not a twentieth of the Emperor's stock.

To give you an idea of the value of a cacao bean, we have the partial list of commodity prices in Tlaxcala in 1545:

- One good turkey hen is worth 100 full cacao beans or 120 shrunken beans.
- A turkey cock is worth 200 cacao beans.
- A hare or forest rabbit is worth 100 cacao beans each
- A small rabbit is worth 30.
- One turkey egg is worth 3 cacao beans.
- An avocado, newly picked, is worth 3 cacao beans; when it is fully ripe, only 1 bean.
- One large tomato will be equivalent to a cacao bean.
- A large sapote fruit, or two small ones, is equal to a cacao bean.
- A large axolotl (larval salamander, an Aztec delicacy) is worth 4 cacao beans.
- A tamale is exchanged for a cacao bean
- Fish wrapped in maize husks is worth 3 cacao beans.

The Spanish tried to get the Aztec merchants to evaluate beans by weight, as was done in Europe. The Aztecs had no system of weights when Europeans arrived. The Spaniards gave up this idea when they were constantly cheated in the weights because of rocks or other debris. They went back to the system of counting each bean to determine how rich one was. Possibly, this gave rise to the term "bean counter" in modern society.

The Spaniards were more than happy to trade with this "happie money" as they called it. But after the conquest, when trade was not only in cacao beans, but in gold and silver as well, those clever Aztec counterfeiters turned their arts on the coin of Spain, and began to reproduce the gold and silver as well as the cacao bean.

When the Spanish arrived in Central America, they encountered peoples drinking the cacahuatl (ca-ca-wa-tay) made of these ground beans, mixed with other flavorings such as vanilla, achiote and chilies. The Maya called it chacau haa, or chocol haa (depending where in the Yucatan one hears it) which means "hot water." The Europeans saw the "savages" drinking something that disgusted almost every man who witnessed this practice. First of all, the natives always poured it back and forth from cup to cup to make it foam. It was dark colored, and they thought of the foam on top as "scum."

And then there was the name. Most of Europe understood the Latin of "caca" as feces or offal. And to hear the natives rave about this scummy mixture, and offer it to their guests as a great honor, calling it "caca-something" caused the Spanish to avoid drinking it as long as possible. Imagine for a moment their horror at the thought of drinking something that looked like that!

The word chocolate isn't a part of Nahuatl, the Aztec language. In order to avoid offending those of the Old Country when they imported these cacao beans, the Spaniards took the "chocol" from the Maya, and added it to the Aztec "huatl" and invented a whole new word "chocolhuatl" pronounced "choco-la-tay" for the name of this new beverage. It was so much easier to stomach than anything associated with "caca."



Another problem with introducing this beverage to Europe was the taste. The Aztecs took it cold and savory with chilies and the bitter chocolate. They relished the bitterness and the darkness of the cacao, and in their religion it even was symbolic of blood. It was quaffed as a symbol of the ties between the gods and life and death, and sacrificed to the gods, both as beans and the drink.

The colonists in New Spain drank chocolate every day, but were not pleased with the bitterness of the drink. They began changing the recipe to please their palates, adding first honey and, later, sugar. Europeans also liked it better hot, as the Mayan made it.

The chocolate addiction in New Spain (Mexico City) was more among the ladies of the Spanish colonists than among the men. After a dinner party, the men went into the salon to smoke tobacco and drink brandy, while the women went into the sitting room to visit and drink hot chocolate. These women became so fond of chocolate that they took it two and three times a day. In fact, the Bishop of New Spain petitioned the Pope for a writ to be issued against the use of chocolate because the ladies would come to Mass and the sermon would be interrupted several times when one or another of the ladies' maids would come into the cathedral with a cup of frothy chocolate.

Unfortunately for the Bishop, another faction that was deep into the drinking and importation of chocolate was the Society of Jesus. The Jesuits were not only concerned with obtaining enough chocolate for their own use, they became a real force for the spread and importation of cacao beans, and introduction of the delicacy to European palates.

Spain became very involved with chocolate through the 1500s. There was not a noble drawing room without a chocolate service, including specialized cups and vase or pitcher for the frothing of the drink. The aristocracy were completely enamored with the elixir.

The medical community of the time thought that chocolate should be taken every day to maintain a healthy balance of "humors." Medical wisdom then current held that there were four fluids of the human body. The chart below shows the fluid, its properties and the Organ from which they emanate

Fluid	Properties	Organ
Blood	Warm and moist	Liver
Yellow bile	Warm and dry	Gall Bladder
Black bile	Cold and dry	Spleen
Phlegm	Cold and moist	Kidneys

It was thought that any disease or malady was caused by an imbalance of one or another of these humors. The cure, therefore, would be to take food of the nature of the opposite to your supposed imbalance.

Some of the first experts who evaluated food from the New World saw chocolate as cold and dry, probably because of its unfortunate naming. Since it was usually prepared with vanilla, considered hot because of its mythical "venal" properties, both chocolate and vanilla were thought at one time or another to be aphrodisiacs. Since the chocolate was cold and the vanilla was hot, as were the chilies (speaking of humor and not flavor), some physicians thought that taking chocolate would balance most imbalances a person would have. In other words, chocolate, for a while, was the equivalent of an apple a day.

Modern Chocolate

It wasn't until the Industrial Age that chocolate became anything we would recognize. In 1765, Dr. James Baker of Massachusetts and his partner John Hannon from Ireland invented a process that attached rollers to a grist mill. This process made chocolate cheap enough for the working masses because it took out the handwork. We know this company today as Bakers Chocolate, which we can all buy in the supermarket.

In Holland, Van Houten invented a process to remove half of the cocoa butter and allow the chocolate to be ground into a fine powder (cocoa powder) in 1828. The alkalines added to defatted the cacao darkened the chocolate to the color we are familiar with.

In France and Italy in the late 1700s, chefs began to experiment with chocolate, adding it to crèmes and puddings, ice cream, wafers, cakes and confections. The infamous Marquis de Sade was a confirmed chocoholic, and was always writing to his wife from prison asking for chocolate confections.

In the middle of the nineteenth century, the medical community was finally able to leave the Galenic theory of Humors behind, and people could eat according to taste and finances, and not have to try to match their symptoms with the right kind of food. This was the same time that the British moved to wean their navy from grog. The company of J. S. Fry & Sons became the largest chocolate manufacturers in the world because of their exclusive contract with the Royal Navy. Their competitor in England, Cadbury, kept up by obtaining royal privilege as purveyors of chocolate to Queen Victoria. Cadbury was also the first to introduce the chocolate box, containing candies and decorated with a painting of Cadbury's young daughter Jessica holding a kitten.

The Victorian era was also a time of rampant food adulteration. As the demand for chocolate for all classes of society continued to rise, unscrupulous companies were known to add such things as powdered dried peas, flour, potato starch, iron rust, pulverized cacao shells, gum, dextrin, or even ground brick to stretch the chocolate. Some even removed all the cacao butter to sell somewhere else. It was replaced with olive oil, sweet almond oil, egg yolks, or suet of veal or mutton. This caused the resulting product to go rancid very quickly.

The British Food and Drug Act of 1860 and the Adulteration of Food Act of 1872 drove chocolate companies to show the percentage of real chocolate in their product. Today the English are great consumers of chocolate, eating more per capita than America, even though the product is still seventy percent sugar.

The Pure Food and Drug Act of 1906 in the United States finally forced unscrupulous manufacturers to do the same thing. The act was brought on by Teddy Roosevelt after he read the novel "The Jungle" by Upton Sinclair. The president decided that enough was enough. From the beginning of the nineteenth century, many chocolate factories opened in Switzerland, and today the Swiss are the number one

consumers of chocolate, eating eleven pounds per person per year compared to America's five pounds per person per year. It was in Switzerland that milk was most successfully added to chocolate. That process was a collaboration between Henri Nestle, the man who discovered the process to make powdered milk, and Daniel Peter, who came up with the method to use the powdered milk with the powdered chocolate to create eating chocolate. The first milk chocolate bar was produced in 1879. The process was simple; they dried out the moisture in the mix and replaced it with cacao butter, so that it could be poured into a mold.



That same year, Rudolph Lindt invented "conching" which rolls the cacao beans for up to seventy-two hours, and heats the beans enough that sometimes they can skip the roasting process altogether. Jean Tobler, inventor of Toblerone, invented "tempering." This means that the temperature of the chocolate liquor is raised, then carefully lowered so that the crystal structure of the fat may be destroyed. This is what makes our modern chocolate so smooth and glossy. It is a vital step in the finest chocolate, which has a high percentage of cacao butter added back in.

Another problem with defatted cocoa powder, is that it is very difficult to get it to mix with milk or water, especially for cold applications. To overcome this, manufacturers have been adding a wetting agent, or emulsifier. The agent of choice is soy lecithin, made for soy beans. It is a cheaper than egg yolks, and can also give a good balance to the chocolate without changing the flavor.

The story of chocolate in the United States of America would be incomplete without a word about Hershey. Milton S. Hershey was born in Pennsylvania in 1857. As a youth, he was apprenticed as a confectioner, and at the age of nineteen opened his own candy shop.

Almost twenty years later, after visiting a World's Fair, and seeing how chocolate was produced in Europe, he decided that chocolate was his calling. He went to Europe and toured confectioners in England and on the continent, then sold his candy business for a million dollars, quite a lot of money in 1893.

With those funds, he bought a large dairy farm in Pennsylvania and built the company town of Hershey, so that he could mechanize the making of chocolate. All the milk that went into his chocolate was from his dairy farms that surrounded the town. All the sugar came from Hershey, Cuba, where he mechanized that process, and bought two electric railroads to carry sugar and passengers to the port and to Havana. The company maintained ownership of this production in Cuba until Castro "nationalized" it.

Hershey was not so much a robber baron as the railroad tycoons or the mine owners, some of whom built towns for the workers in their factories. He was more of a socialist in his attitudes and believed that happy and successful workers were more productive than mere wage slaves. While the town did not have its own government, and he lived in a mansion patterned after George Washington's Mount Vernon, he did not rule as a despot. He built five churches, an industrial school for orphaned boys, a hospital, schools, and a golf course. It was everything he wanted in his ideal American town.

Hershey took all that he learned in Europe, then bought his beans from selected sites in Central and South America, Ceylon, and Java. He bought the new conching and molding machinery from Switzerland, and took America by storm. By the 1920s, his factory was turning out 50,000 pounds of cocoa powder a day. In the 1980s, no less than 25 million Hershey's Kisses rolled off the lot per day. Hershey died at the age of 85, quietly, in the hospital he had built for his company town. Chocolate was never the same again.

Chocolate Processing

In today's modern world, the chocolate we buy in the supermarket is already highly processed. Even the unsweetened baking chocolate would not be recognizable to the Aztecs who introduced chocolate to Europe.

The process for chocolate begins with the pods. Before the beans are removed, the pods must be aged or "fermented." This means that they need to sit for a couple of days in a specific environment and allow the moist fruit around the seeds to soften and change the flavor of the beans.



Next, the beans are roasted and winnowed to remove the hulls. Then they are ground in a heated system. In the sixteenth century this was a mortar and pestle with a brazier underneath it. Then the cocoa nibs from this process were taken to a heated *metate*, which is a flat stone with a cylindrical roller called a *mano*. This cylinder is moved by hand to grind the nibs to a paste. Heat is needed in this process because chocolate is more than fifty percent cocoa butter. The resulting paste is difficult to dry because of the high fat content.

On the metate is where the other ingredients are added, such as the spices, sugar, vanilla, or chilies. When the paste is smooth and ready, it was put into brown paper covered molds and left to harden. These wafers were not anything like we would expect of edible chocolate. It was dry and brittle, very very hard. It could be chopped, added to hot water and frothed for a drink, but it was rare that anyone would eat it directly.

Grantville

So where does all this information get us? In 1629 to 1630, before the Ring of Fire, there was probably no chocolate for sale in Germany outside of the northern port cities, or the southern Bavarian cities, such as Munich. Because Spain has tried so hard to keep a monopoly on chocolate, it is slow to become known in Germany. France and Holland were early exposed to its richness, as were the Hapsburgs. But if the Ring of Fire had not delivered Americans in the beginning of this decade, it would be close to thirty years before the habit of chocolate houses and drinking of chocolate, coffee and tea would catch on in central Germany and the northern parts of Europe.

But with the financial connections in Grantville, chocolate is already being traded. There are already people in town with their own supplies of cacao nibs. These are not anywhere near commercial quantities. With the transported Americans craving Snickers and M&Ms, the demand for chocolate would probably outstrip the demand for coffee.

The chocolate that is bought is not the chocolate that Grantville is expecting. What will be imported will be the cacao beans and the professional chocolatier who knows the process of grinding and mixing. Europeans are enjoying sweetmeats and other delicacies of sugar, but chocolate of this time is strictly for drinking. No one has thought of eating solid chocolate, because it does not look like anything you want to bite.

The Grantvillers will need to build their own versions of the processes of Dutching, conching, and tempering, which will be intensive and time consuming, as well as expensive. As there are many Jews that are displaced from Spain at the moment, it is not inconceivable that one of them would be a master chocolatier, who is an expert of grinding and mixing cacao paste. These people would be more than happy to ply their profession for the Theobroma-starved masses of up-timers in the USE. It may be a couple of years before we get Toblerone, but brownies and fudge should be available by 1633 of the Ring of Fire. And because of the demand the chocolate eaters of Grantville, by 1634, we will have modern chocolate.

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Tennis: The Game of Kings

Written by Iver P. Cooper



Many of the stories of the 1632 Universe relate to the flow of ideas—technological and social—from the up-timers to the down-timers. But the flow can be in the other direction, too. My story "The Chase" (*Ring of Fire 2*) relates how the up-timers learn about the ancient form of tennis—Royal Tennis—from Thomas Hobbes and William Cavendish.



In the Renaissance, tennis was truly the Game of Kings. Its royal proponents included Henry IV and Louis XIII of France, Gustavus Adolphus of Sweden, and Henry VIII, Charles I and Charles II of England. Charles I (reigned 1625-49) was willing to rise at five or six in the morning in order to get in a set of tennis.

But the royals weren't the only fans. There were tennis courts associated with several universities and academies. English yeomen were rebuked for swinging rackets instead of practicing their archery. In 1451, the Bishop of Exeter threatened to

excommunicate the canons and their secular confederates who played tennis in the churchyard of Saint Mary's. In 1558, British hatters and joiners were observed playing tennis for a stake of one crown.

In 1590, King Henry IV played tennis against the bakers of Nantes. They won, and refused his request for a rematch. The next day, the king announced that the price of bread in Nantes would be one and half pennies to the loaf. The bakers promptly apologized. (Aberdare, 37)

* * *

The game the up-timers call tennis was known, until recently, as lawn tennis. While the Wimbledon tournament is still played on a grass court, most modern outdoor tennis courts now use other surfaces: red clay, green clay, or cement. Moreover, the modern game can be played indoors. Given that the old name is now a misnomer, and the original form of tennis is now somewhat obscure, it is not surprising that "lawn tennis" is now known simply as "tennis."

This forced the remaining proponents of the older game to come up with a distinctive name for it. It is called "real tennis" (U. K.), "court tennis" (America), "royal tennis" (Australia) and *jeu de paume* (France). I will follow William's example and use the term "royal tennis" here.

Since lawn tennis was invented in 1873, any reference to "tennis" before that year is actually to the older game.

Tennis Geography

France was the heartland of seventeenth-century royal tennis. Even small towns could have a court. In Orleans, there were sixty. The estimates of the number of tennis courts in Paris, circa 1600, range from 250 to 1,800; Sir Robert Dallington was sure that there were two tennis courts for every church. (Aberdare, 38; Squires, 12). Some form of tennis was also played in Italy, England, Scotland, Spain, the Netherlands, Sweden, Switzerland and the Holy Roman Empire.

As of 1632, there were tennis courts in several towns of the Holy Roman Empire, including Vienna (two-1526, 1552), Salzburg (1620s?), Augsburg (1548), Frankfurt, Nurnberg, Halle, Heidelberg (two-built 1548, 1618), Munich, Kassel, Tubingen (1592?), Ingoldstadt (1593/4), Strasbourg (two-first in 1603), Ziegenhain, Basle, Marburg, Darmstadt, Butzbach, Giessen, Lubeck, Jever, Cologne (1595), Oldenburg, Buckeburg and Prague (1568). The last court was used by Wallenstein in 1604.

The first Swedish court was built at the behest of Eric XIV (1560-8). I don't know its fate, but another royal court was built in 1627, for Gustavus Adolphus.

Hobbes and Tennis

Thomas Hobbes played tennis even when he was in his seventies. John Aubrey said that this occurred "twice or thrice a year," while Samuel de Sorbriere has the elderly Hobbes on the court "once a week." Both men knew him personally.

Presumably, Hobbes learned the game when he was at Oxford (Magdalen Hall). There were at least four courts on the university grounds.

The poet George Wither was a fellow Magdalen student, and in 1604, "he found more delight in 'practice at the tennis-ball' than in practice at 'old Scotus, Seton, and new Keckerman.'" (Littell's *The Living Age*, 174, July-Sept. 1890). In 1628, a Fellow of Merton wrote that the marks of the seniority of a university man were "the bare velvet of his gown and his proficiency in tennis, where when he can once play a set, he is a freshman no more." (17C tennis, 46)

After receiving his B.A. in 1608, Hobbes "associated" at Cambridge — possibly because his first pupil and companion, William's father, was attending that university. At Cambridge, he would have had ample opportunity to feed a tennis addiction; there were at least eleven courts at that school. (Aberdare, 46).

I have not found any indication of whether the historical William Cavendish played the game. However, in the story, he attends a French academy, and would certainly have had tennis lessons there.

The Court

Tennis was first played outdoors. In France, once indoor courts were built, the game played outside was called *longue paume* (the long game), and the indoor version *courte paume* (the short game)(Squires 10).

The outdoor game was initially associated with monasteries, and most (but by no means all) authorities believe that the game was invented by monks.

A standard feature of monastery architecture is the cloister, a square or rectangular courtyard flanked on each side by a "penthouse," a gallery with a sloped roof. In the monastery, the galleries were animal stalls, or colonnaded walks, but in the dedicated tennis court, they provided space for spectators. Some openings became winning openings, while others, if targeted, led to a special proceeding (the "chase").



When the game was played in the cloisters, you needed either lots of players on each side, or an out-of-bounds line. Even with the line, you had to run after the ball a lot.

This ad hoc court posed other problems. Antonio Scaino (1555) soberly considers what to do if one of the shots touches a passing cart, and is then returned. His judgment is that if the ball bounced up, or was still rolling, as a result of the original impetus, then it remained in play. However, if the ball had come to a stop, and was then "scooped up," then the ball was dead at wherever the cart had been when the ball came to rest (61). I wonder what John McEnroe would have made of that call.

Noblemen sent their children to study in the monastery, and the kids took the game home with them and, as adults, built courts designed for tennis. Initially, these looked like half-built cloisters, with penthouses on three sides.

The customized courts replaced the out-of-bound line with a wall (now called the "main wall"), reducing the time wasted hunting for errant balls. But it was still possible to hit the ball so it sailed right over the penthouse, and that was inconvenient. The solution was to surround the penthouses with high walls.

From there, it was just a small step to making the players free of concerns over the weather by placing a roof overhead. In order to provide light, the upper story of the building was a clerestory.

While lawn tennis can be played indoors, the only purpose of the walls is to hold up the roof that keeps the rain out; in royal tennis, the walls are playing surfaces, as in the later game of squash.

* * *

By Scaino's time, the gallery behind the receiver was walled up so as to leave only a single opening called the grille. Its wall was therefore called the grille wall, and the penthouse above it, the grille penthouse. A cloister, technically, is a space closed to outsiders, and the grille was the opening where the monks communicated with visitors. This historical tidbit was no doubt of less interest to the players of Hobbes' day than the fact that it counted as a winning opening for the server.

* * *

There was less consistency in how the opposing penthouse, behind the server, was structured. The court at Halle, and the one simulated at the Higgins Hotel, are of the kind known as *jeu a dedans*, because they kept the large goal-gallery (*dedans*) at the server's rear. This also acted as a spectator area.

In contrast, some courts (*jeu carre*) replaced the *dedans* with one or more of three different types of smaller winning openings. The *ais* was a tall narrow recess, with a wood plank six feet high and one foot wide suspended in front of it. The *trou* was a square hole at ground level, while the *lune* was round and high up (like a full moon). At some courts, at least, getting a ball through a *lune* didn't just win a point, it won the entire game.

The Tübingen court was a *jeu carre*, and so, too is the surviving court at Falkland Castle. All other modern courts are of the *jeu a dedans* type.

* * *

We still need to describe the galleries (openings) under the side penthouse, facing the main wall. There are four on each side of the net, and only the one on the receiver's side, furthest from the server is a winning opening (it is called the "winning gallery"). These side galleries, and the *dedans* if any, are best thought of as being window-like, since the openings don't reach all the way

to the floor.

Both sides can be divided into a forecourt nearer the net, and a backcourt nearer the end wall. The side penthouse galleries flank the forecourt.

* * *

The three winning openings—the dedans on the server's side, and the winning gallery and the grille on the receiver's side—are each covered by a net, so the ball doesn't escape, and the net is fitted with bells, which are rung by the hit, so there is no doubt that a point has been scored.

* * *

Some courts put a kink into the main wall, called the *tambour* ("drum"). Many scholars believe that the tambour was derived from, or imitative of, the buttress of church architecture. Whatever its origin, the tambour is shown on Scaino's 1555 plan of the tennis court at the Louvre. In general, the *jeu a dedans* courts had the tambour, while the *jeu carre* didn't, but there were exceptions.

The practical significance of the tambour is that if you hit a shot off the sloped section (the "face"), it changes direction ninety degrees. If the face is hit properly, the rebound is straight toward the "winning gallery," one of the winning openings on the receiver's side.

The "Tennis Court Oath" was one of the signature events of the French Revolution (1789). The delegates of the Third Estate (peasants and bourgeoisie), locked out of their normal meeting room, gathered instead in the royal tennis court, and swore not to disband until they received a written constitution. There is a famous painting of this scene by Jacques-Louis David; look closely, and you should be able to see two penthouses and the tambour.

* * *

The seventeenth century court probably had a flagstone floor. Dimensions varied. Henry VIII had four courts at Whitehall: the giant "Brake" (130 X 40 feet), and three smaller ones (78 X 22, 72 X 18, 60 X 18)(Abeldare, 41). The Louvre court was 114 X 38 feet, and the royal court in Stockholm, 104 X 44.

The 1911 *Encyclopedia Britannica* article on "Tennis" (EB11) suggests that the floor, not counting the penthouses, be about ninety-six feet long and thirty-two feet wide. The dimensions recommended by De Garsault's 1767 treatise are almost identical; ninety by thirty.

In contrast, a lawn tennis court has an in-bound area which is just seventy-eight feet long and twenty-seven feet wide (thirty-six for doubles).



In royal tennis as played today, a ball is out of bounds if it hits the ceiling, or strikes a wall above a line marked for that purpose. The concept of a height limit is expressed, somewhat obliquely, by Scaino; it appears to have been the maximum height reachable with a racket by one of the players (the tallest?) (62).

According to EB11, the vertical fault line should be eighteen feet high at the sides and twenty-three feet high at the ends. In contrast, the vertical distance from the floor to the tie-beam is thirty feet.

* * *

For the cost of building a seventeenth century tennis court, there is data from Cambridge University. The one at Trinity College was pulled down, then rebuilt in 1611 for 120 pounds (Willis). That is equivalent to about \$50,000 (in year 2000). Of course, the size of the court, and its design (wood or stone, roofed or roofless) will affect the price.

Nets

The court is divided by a net. Its original purpose was to keep the two sides separated, so they didn't fight. One side of the court is the serving side, the other side is the receiving, or "hazard," side.

The first illustration showing a net—more accurately, a simple rope dividing the court—was painted in 1540. However, thirty years later you could still find depictions of tennis in which the line was missing.

While the rope discouraged players from crossing into "enemy territory," and then brawling with their opponents, it didn't quell dispute. Instead, the players argued as to whether the ball had gone above or below the line. There is a case from Antwerp in 1567 in which this led to one player murdering the other.

The solution was to hang fringes down from the line, so that the under-passage of the ball would make an obvious disturbance. A fringed net can be seen in the frontispiece of Charles Hulpeau's *Le Jeu Royal de la Paulme* (1632).

Racquets and Balls

Tennis evolved from a game in which the ball was hit with the hand—that is why the French still call it *jeu de paume*. This limited the power with which the ball could be struck. In the twelfth century, the players wore gloves; in the thirteenth, they added a thong binding (whose elasticity help propel the ball), and finally, in the fourteenth century, a kind of bat appeared. The striking surface of this *battoir* was covered with parchment.



The next major development, which occurred in the sixteenth century, was to replace the solid wood head with one in which catgut was strung on a wooden frame, thus arriving at a true racquet. (Squires, 14).

The nineteenth-century racquet is described by EB11 as being 27 inches long, with a nine by six inch head, weighing about one pound. Unlike the lawn tennis racket, it was asymmetric.

* * *

EB11 describes the balls as being made of strips of cloth, covered with white Melton cloth tied with twine. These early twentieth-century balls are 2 1/4 inches diameter, and weighing 2 1/2 ounces.

In the early seventeenth century, the stuffing was human or animal hair, not rags. Shakespeare's *Much Ado About Nothing* jokes that Benedick's beard was much used for stuffing tennis balls.

* * *

It is doubtful that Hobbes or Cavendish are intimately familiar with the techniques of making balls or racquets, this art being monopolized by the guild professionals (called ballmeisters in Germany, *maîtres-paumiers raquetiers* in France).

But it is certainly possible for someone in Grantville to buy contemporary balls and racquets, and try to "reverse engineer" them. It isn't rocket science.

Dress

According to De Garsault (1767), the resident tennis pro supplies the players with "caps, shirts, shorts, under-waistcoats, stockings and tennis shoes," for a mere fifteen sous.

However, there undoubtedly were players who had their own outfits. One of the more curious incidents of the English Civil War occurred in 1643, when Parliament granted George Kirk a pass to transport the necessaries for making up a new tennis suit for his Majesty from London to Oxford.

The first tennis player in all white duds may have been Henry II of France . . . of course, the doublet and straw hat would seem out of place nowadays. (Aberdare, 35).

The Serve

One of the defining features of royal tennis, and the one which probably distinguished it from earlier ball games, is the service off the roof. You have to hit the ball so it bounces at least once on the receiver's half of the side penthouse before it bounces on

the floor. It is all right if it bounces first on the server's side of the penthouse, or on the service wall above the penthouse. The serve could be delivered from anywhere in the server's backcourt.



The receiver's backcourt is divided by a "pass line," parallel to the side wall, into a "receiving court" and a "pass court," the latter being a small area adjacent to the grille. The receiver can volley the ball back (return it before it hits the floor). If the receiver allows it to bounce on the floor, then to be a good serve, it must bounce for the first time in the receiving court. If its first contact with the floor is in the pass court, that counts as a "pass" and is ignored.

A serve which is neither "good" nor a "pass" counts as a "fault," and two successive service faults costs the server a point. However, the server doesn't lose the serve unless a chase is played off.

* * *

The side penthouse, with a sloped roof, is the *sina qua non* of royal tennis. But even if the Higgins Hotel hadn't had a courtyard with sloped roofs, William and his Barbie Consortium friends could have improvised something. In 1494, a resident of Antwerp obtained permission from his neighbor to clamp a forty foot long slanting roof to the wall dividing their properties. Moreover, would-be tennis players could make do with an even shorter penthouse. There are illustrations from the sixteenth and seventeenth centuries which show French children playing a ball-and-racket game. There is no net, but they are clearly bouncing the ball off a board mounted obliquely on a wall. The board is mounted perhaps five feet above the ground, and is about three feet long. (Gillmeister Figs. 29, 33). There are also illustrations which show a small free-standing penthouse for outdoor use (Fig. 34).

The roof of last resort, available even to country folk, was a makeshift mobile roof: a washboard resting, at one end, on an upside-down tub, or a three-legged corn sieve with a block under one of the legs.

Rallies (Rests)

Once the serve is returned, the rules are more relaxed as to where the ball can bounce and still be in play. The ball still has to cross the net before it hits the floor, but it can bounce off a penthouse roof, or a wall. It can bounce once anywhere on the floor, on the other player's side, too.

The Divine Chase

Besides the wall and roof play, the most distinctive feature of royal tennis was the chase. Consider Shakespeare's *Henry the Fifth* (II, ii), in which Henry responds to an insulting gift of a tun of tennis balls:

**When we have match't our rackets to these balls,
We will, in France, by God's grace, play a set,
Shall strike his father's crown into the hazard.
Tell him he has made a match with such a wrangler
That all the courts of France will be disturb'd with chases.**

In lawn tennis, if the ball bounces twice on the floor, the player who allowed it to happen loses the point. That isn't necessarily the case in *royal* tennis. A second bounce, in the right place, creates a chase. The point is held in abeyance, to be resolved later. The serving player keeps the service until there is one chase in dispute, and a player is a point short of winning, or until a second chase is created. The chase, or chases, are then played out.

The medieval rule was that the chase was marked where the ball, after bouncing twice, finally came to rest. When Henry VIII

of England and Charles V played against the Prince of Orange and the Marquis of Brandenburg in 1522, there was a third player, a lesser nobleman, on each side, the "stopper." His role was to stop the run of the ball, somewhat like a goalkeeper in soccer, if that would be advantageous. (The term "chase" may have evolved because the stopper had to literally chase the ball down.)

By 1539, the Spanish and French had adopted the "modern" rule, under which the chase is marked at the location of the second bounce. At first, there were often quarrels, sometimes physical, between the players as to whether the chase was properly marked, and this led eventually to the use of impartial professional markers, one on each side.

On the server's side, a second bounce anywhere on the court creates a chase. On the receiver's side, the second bounce must be in the forecourt.

A chase is also created if the ball goes into any opening, other than the "winning gallery," on the side wall. There is a chase line corresponding to each gallery opening.

The player who let the ball bounce a second time on his side of the court, or let it go through the side gallery on his side, will have to defend that chase. The other player, the one who laid down the chase, attacks it.

If that chase were on the service side, the original receiver, who laid down the chase, comes over to the service side to attack it, and the original server goes over to the hazard side to defend it.

The attacker now serves. Attacking the chase means he will try to either hit a winning opening, or achieve a second bounce which is better—closer to the wall—than the chase was. That doesn't have to be on the serve itself, of course.

If the service chase is a tough one—close to the wall—the attacker will probably aim for the dedans. Perhaps bouncing the ball off a wall, to trick the defender. And the defender will try to volley the shot back.

There can also be a chase on the hazard side, laid down by the server. The server still crosses over to the hazard side, to defend it. But hazard chases, by definition, are relatively far from the grille wall, and so are easier for the attacker to beat.

As Hobbes can tell you, it is important to get distance on every shot, or the other player will just let the ball bounce a second time, and then laugh at you as he wins the subsequent chase.

Strategy

From an offensive standpoint, you have two basic choices: aim for a winning opening, or just try to keep the opponent off-balance. He might swing and miss or hit the ball into the net, thus giving you the point by default. He might misjudge where the ball will bounce for the second time, allowing you to defend a chase on favorable terms.

If you aim for a winning opening, it doesn't have to be a direct shot; you could try for a ricochet off a wall.

You have three basic choices every time the ball comes over the net — volley it right back, let it bounce once and then return it, or let it bounce a second time and make a chase which you can attack at the proper time. Volleying was considered safest, because the floors and walls were uneven, and hence the bounces were unpredictable.

The Players

In the indoor game, there were usually one to three players on each side. Longue paume was definitely played with teams of four to six, and I would guess that the only practical limit was the one set by the size of the field.

Women players were rare and therefore noteworthy. The Chris Evert of the fifteenth century was French. De Garsault, writing in 1767, says that "in 1427 there arrived in Paris a young woman of Haynaut, aged 28 years, named Margot; she played this game excellently, surpassing the most skillful. She had chosen a gaming-house in the Rue Grenier S. Lazare, a house named 'The Little Temple,' where she held her own against the strongest players. People went to see her, drawn by curiosity as to something extremely rare."

Scaino's 1555 treatise says, "in Udine, the chief town of the Friuli, and elsewhere, charming maidens take simple pleasure [in tennis] in our times, and in Ferrara, . . . there were formerly damsels wonderfully expert and clever at the cord game with the racket." (p. 24). In 1598, women were playing tennis in Blois, France. (Abeldare, 38)

The Pros

In France, the tennis professionals were organized into a guild as early as 1457. Originally, they shared their guild with the

brush-makers, but they split off in the sixteenth century. (Aberdare, 36)

The Collegium Illustre in Tubingen was a "Knights' Academy," a finishing school for courtiers. Its ballmeister taught dancing as well as tennis. In the mid-seventeenth century, he was paid 162 florins cash, plus rye, grain and wine. That meant that he was paid better than the fencing master, the riding master, and the history and law professors. Tennis lessons were free to the students, but others could be charged a tennis tuition of one and a half reichstaler a month. (Gillmeister, 155)

The Cost of Play

In France in 1767, you paid 12 sous an hour to practice, and to play an actual set, 25 sous an hour on a dedans court and 20 on a quarre court. (Garsault, 27).



However, the biggest expenses were lost wagers. Each player put his money under the net (so the loser couldn't renege). The winner collected the pot, and the loser also paid for all lost balls.

The players could agree to a bigger payoff for certain kinds of victories. The single victory was in which you just outscore the opponent. The double victory, one in which you shut him out. And the triple victory, the most glorious of all, was where you lose the first three points and then score five points in a row to win.

Players differed in ability, and there was a complex system of handicapping to allow for this. For example, a player awarded a bisque could, in each set, claim one stroke which had been lost.

There were more peculiar handicaps than this: the stronger player could be forbidden to touch the walls, or limited to one half of the court, or constrained to send the ball over a higher cord, or to play with a battoir rather than a proper racket. (De Garsault, 31).

Conclusion

Scaino assured readers that tennis had been played by Alexander the Great and Julius Caesar. All this proves is that the celebrity endorsement, real or feigned, is nothing new under the sun.

His marketing pitch continued by urging that the game inculcated skills of generalship, such as the "arranging of armies, planning of a battle, the capture . . . of a strong place, advance and retreat in due time and order, the making of strategic moves not thought of by the enemy." (25)

At that time, it apparently wasn't enough to say that the game was fun to play. But clearly it was. In the early seventeenth century, royal tennis was an extraordinarily popular game. The French were said to be "born with a racquet in their hand," and the British, the Italians, and the Germans were not far behind them.

It remains to be seen whether, in post-Ring of Fire Grantville, royal tennis eclipses its up-time rival, lawn tennis.

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THE END

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