

[Novelette, lead story in ANALOG, April 1996]  
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THE COPYRIGHT NOTICE CASE

by Paul Levinson

The gust caught my umbrella the second I got out of my car, before I'd even had a chance to fully open the thing. I struggled for a bit, then gave in to the inevitable. Another insideout dripping mess to deposit in the trashcan. The wild force of nature wins again.

I turned my collar to the cold rain and hustled up the brownstone stairs. I pulled out my ID and showed it to the uniform.

"Down the hall, one flight up, second door on the right. They're waiting for you, Dr. D'Amato."

"Right," I said. I hated these long brownstone stairs -- rushing up them always made me breathless these days. I guess I could've walked up slowly, but that wasn't my way.

"Phil," that was Dave Spencer, even less hair and more belly than I, bent over a body, male, looked to be in his late 20s. "Come take a look at this." Dave was the coroner. He often called me in for special consultations -- came with my forensic territory.

I looked. The corpse had his eyes wide open, like he'd been shocked to death. But there were no electricity burns on the body that I could see, and in fact the nearest electrical outlet was some 15 feet away next to a computer on the other side of the room.

"Chemical, food allergy, lethal injection?" I rattled off the usual suspects in cases like this. And of course there was the unstated omnipresent social tetrad of choices: death by natural causes, accident, suicide, or murder.

"Not likely," Dave shook his head. "No obvious puncture marks. No discoloration of the lips. We'll know more after the full test course."

"So what's your best guess?" I asked.

"I have none," Dave said. "That's why I asked you in. It's like something reached in and turned up the juice in this guy's nervous system. Turned up the volume to lethal levels. Looks like heart attack and ten other things gone wrong here -- never seen anything like it."

"All right," I said. "I'll have a look around." For some reason, I had a reputation in the Department as the forensic scientist to call in when something inexplicable seemed to have happened. Well, I knew the reason -- I'd been involved in my fair share of weirdo cases in my time, some of them public. And my popular writings in fields ranging from physics to genetics were pretty well known. "This guy have a name?"

"Glen Chaleff," Dave replied. "Some kind of computer programmer."

Chaleff's apartment was nothing out of the ordinary. Bland furniture arranged unsurprisingly around off-white painted walls. The computer was the only thing that caught my eye. It

was a sophisticated machine, lean and very powerful, it seemed to me, something well beyond the latest commercial chip. The screen had two words on it.

"Copyright Notice"

I put on my gloves before touching the keyboard -- never mind the standard precaution of not doing anything to disturb possible fingerprints and evidence, I was thinking more about not getting electrocuted on the outside chance that's what had happened to Chaleff. I pressed the up and down arrow keys to see if there was any other text above or below on the screen.

Nada. Just a bunch of hash above, three quarters faded to nothing, like I had come in on the end game of some kind of program that self-destructed after use. I arrowed back to "Copyright Notice."

It was fading away now too.

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Jenna Katen was the girlfriend. There's almost always a girlfriend in these sorts of cases. Lieutenant in charge asked me if I wanted to come in and interview her. She was the reason Chaleff was considered a possible homicide.

"She discovered the body, she says he was working on some kind of genetic project that seems on cloud nine to me, I thought you might have a better chance of understanding what she's talking about, you're a real hound for that stuff, right?" That was the Lieutenant's briefing.

"Right." I said.

Jenna was really striking. Looked a lot better than girlfriends of the deceased usually do, except on television. Soft green eyes and soft brown hair falling around her shoulders just the way I like it. Keep your mind on business, D'Amato.

I could see she'd been crying. "You look too smart for me to offer you a smoke," I said. "How about some caffeine?"

"Sure," she looked up.

"Hot or cold?"

"Diet soda would be nice."

I went outside and coaxed a can from the machine.

"Why don't you tell me your story from the beginning," I said, trying to pour the soda into a cup so that it didn't fizz over the top. Never worked. "Pretend I'm an ignoramus about the science -- but tell me everything, and spell it out as much as you can."

She sipped the soda and squeezed the cup. "Glen was working on a special facet of the human genome project."

I nodded. "The one that hopes to eventually identify and map the function of every gene -- and every protein compound -- on human chromosomes."

"That's right," she said. "Except there are actually a whole bunch of interrelated human genome projects. And this is a special section of a special project. Early on -- about two years ago -- the main team discovered some odd material at the far edge on some X chromosomes."

"On all female chromosomes?" I asked.

"No, the material has so far been seen on only about eight percent of the X chromosomes studied."

"Ok," I said. "And what do the researchers think this odd gene is responsible for?" I knew that that area of the X chromosome was home to at least one interesting human gene -- the so-called gay gene, still under intense investigation.

"Well, that's part of what makes this so unusual," Jenna

said. "The material's not really a gene, and doesn't seem responsible for any behavioral or expressive trait."

"I'm not following you," I said. This is likely where the Lieutenant had lost comprehension.

"Well, the material's chromosomal -- it's some sort of protein code -- but it's not really a gene. Only five percent of the DNA in our genome actually goes into genes. The rest is sometimes called 'junk DNA,' and I guess you could say our little corner of the genome project has been prospecting for an unlikely fortune of information in that junkpile. You know, more clues as to how the human genome works as a whole -- how proteins outside of the genes themselves prime them for operation, act as regulating enzymes, that sort of thing."

"Ok," I said. "And how did Glen fit in?"

"Well, we've -- Glen's -- been trying to, well, read the code on that odd genetic material."

"Come again?"

"The code seems amenable to some sort of binary transformation -- you know, a mapping that would translate the connections inside the protein complex into a series of yes and nos, or ons and offs. Genes themselves operate on a four-part code -- adenine binding to thymine, cytosine to guanine. They're nucleotide bases, you know -- A and C on one side of the helix zipper connecting to T and G on the other. I'm sorry, I'm getting too technical for you--"

"Not at all," I said, though I could've lived without her reciting the specific names of the nucleotide bases. This was basic textbook stuff for DNA fingerprinting. "Please continue."

"Well, like I was saying, the special material that Glen was working on actually has slightly different forms of the nucleotides that make them more like a binary than a four-part system."

"And --," I prompted.

"And, well, the hope, the goal, was that if we could get a reliable transformation of that genetic code, whatever it was, into binary, then we could take that binary rendering and in turn convert it into words on a screen."

"Read the genetic code, literally?" I asked.

"Well, again, yes and no. Not really the genetic code in our genes proper, but this code in a tiny part of the other 95 percent of our DNA on the X chromosome," Jenna said.

"I see," I said, though I didn't yet, at least not fully. "And Glen's death?"

"He phoned to tell me he had completed the final translation of the code, had words up on his screen ... and when I came over, he was dead," she started sobbing. "I think those words killed him."

"Ok," I poured more soda in her cup. So now I knew something: either she had killed her boyfriend, and cooked up this story to throw us off track, or there was something genuinely strange going on here. The coroner's extensive autopsy had already found no demonstrable cause for the sudden massive failure of all of Chaleff's systems that had killed him -- "looks like everything just blew at once for no apparent reason," Dave told me -- so we knew Chaleff hadn't just died of your common heart attack or stroke while he was doing his research. It was something more. Like something had reached in and turned off -- or on -- some master switch, as Dave had said yesterday. The question was who -- and what. And the what was not only what reached in, but what was the switch?

I could see why the Lieutenant was thinking homicide. In cases like this -- cases involving dead young bodies -- the cause of death was all too often murder. Barring tragedies like AIDS, young bodies don't very often expire on their own.

Now it might shock the public to hear this, but in many ways murder is the forensic scientist's best friend. Once the cops get a confession of murder, however inarticulate, it points to the facts, and we can use it, working backward, to piece together a detailed description of the death and its circumstances. Reverse engineering is always easier than working from the ground up.

But truthfully, I hated confessed murder as the cause of death, always resisted it as the explanation until impossible to do so. Not only for the obvious moral reasons -- I'm as glad as the next guy to find a bit less depravity in the human species wherever I can -- but because, well, I savor the thrill of an investigation in which I don't know the final conclusion beforehand, in which science leads to the cause of death rather than vice versa.

And I'd learned the hard way that some kind of nefarious intervention, something worse than mere murder, always loomed as a possibility when research scientists were involved. I'm not talking about dressing up a lover's quarrel or cutthroat professional competition with a fatal malfunction in a laboratory like they do in the movies. I've had experience with things much worse. The public had no idea.

But what was the agent of death here?

Words on a screen?

They made sense neither as a weapon nor a lethally malfunctioning piece of equipment.

"You have any idea what those words were?" I asked.

She looked up at me and her eyes re-focused, as if my voice had pulled her away from some contemplation deep and distant.

"No," she said. "The screen was blank when I arrived."

So now I knew she was probably lying about at least one thing.

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Some of her facts were easy to verify. Jenna had been telling the truth about Chaleff's last call to her apartment. And there was no sign of anyone entering Chaleff's apartment between the time of that call, and the time Jenna arrived, about 45 minutes later, when she said she'd found Chaleff dead.

Her story about the special section of the human genome project took more work to confirm. She'd told me the MIT Media Lab had a piece of the research action. Nic Negroponte, head of the Lab, was an old friend of mine. He didn't know much about that part of the project, but put me in touch with an associate who did.

"Ralph Hertzberg here," the voice on the phone said. "Nic told me to expect your call."

"Great," I said. "Ok. Let me start by trying to explain to you what I think you're working on -- what I understand and what I don't -- and you tell me where I'm wrong."

"Shoot."

"Ok," I said. "DNA is commonly said to be a genetic language, but that's not quite right. It's really a recipe for the construction of other proteins into cells that have specific properties -- heart cells, brain cells, and so forth in humans -- cells and organs and systems that come into being during gestation."

"That's right," Hertzberg said.

"Ok," I said. "So in fact, DNA isn't really a language at all -- it's really an arrangement of proteins that causes other proteins to develop in a certain way, into heart cells, etc. So really DNA is a catalyst for the development of living organisms. But we say as a shorthand that it's a code or a set of instructions. Am I on the right track here?"

"Very much so."

"Good," I said. "All right, then. So tell me this: How do we get from DNA, which isn't really a language -- or is only a language in a metaphoric sense -- how do we get from that to this chromosomal material which Jenna Katen says Glen Chaleff was able to read on his screen?"

Hertzberg sighed. "Not very easily, but I'll try to explain. First, you have to understand that there's lots of protein material associated with chromosomes that we have no idea what the function is. Not everything there is just genes. In fact, most isn't. Some material we've identified as seeming to have a catalyst function for the genes themselves -- sort of meta-catalysts -- some seem to control timing of genetic instruction of other proteins in ways we're just beginning to fathom. But most of this extra genetic material is still a mystery to us."

Right, the so-called junk DNA, I thought. "And the, uh, the linguistic material on the eight percent of X chromosomes is, was, in the mystery area?"

"Yes."

"Has this material been found only on human chromosomes?"

"So far, yes," Hertzberg said. "Primate chromosomes were the first other place we looked -- chimp and ape DNA is 99 percent the same as human -- and we found nothing like it."

"Nothing that could generate words on a screen?"

"Look, let me be honest with you," Hertzberg said. "I know what Jenna told you, but we don't even know for sure that this binary chromosomal material can be converted into readable words. It seems transformable into a binary code, yes, but we have no way of really testing the accuracy of that transformation, since we have nothing precisely of this kind to measure it against. And we certainly don't know for sure if that code can support actual words. What we get from that code at first is some sort of general proto-language, strongly resembling Indo-European in its subject-predicate structure, and therefore recognizable as a real language to some researchers, I guess. And assuming that to be Indo-European, or proto-Indo-European, we can make rough translations into English, Sanskrit, what have you. But the results are extraordinarily speculative to say the least -- I'd say the noise to signal ratio must be well over 40 percent in the final translation. Though that's conjecture too -- the actual distortion could be far more, or less, for that matter. Bottom line: We're dealing with a hell of a lot of conjecture here. That's why we haven't published anything about this yet. It's still in the very early stages of research. Most of our work is."

"All right," I said. "Let's back up a little -- I'm very much a layman when it comes to linguistics. What made you think in the first place that the binary transformation of chromosomal code yielded patterns that looked like Indo-European?"

"Ah," Hertzberg said. "That was the relatively easy part. We already have ASCII table renderings of most known human

languages, including many long extinct. ASCII and binary configurations are readily transformable into one another. So when we converted the binary chromosomal code to ASCII, its similarity to primal Indo-European in ASCII was noticed right away."

"Yet you don't sound very optimistic." I appreciated the value of a research leader willing to pull in the reins on the wildest fantasies of the team, though personally I preferred someone who jumped on the lead horse and urged it to fly even further.

Hertzberg grunted. "It's the monkeys on a typewriter typing Shakespeare problem. Or maybe sticking a duck's feet in a can of wet red paint, and having it walk across an empty canvas, is a better example. Is that art? It looks like art. But we can't accept it as art, because we know its resemblance to art is just a coincidence. Same with the chromosome code -- the fact that it looks like an Indo-European language doesn't mean it is. Sometimes the reason that two words in very distant languages look like each other is just coincidence. If I were pushed for an assessment at this point, I'd have to say that that's what we're dealing with here."

I on the other hand was never a big fan of coincidence. It often was a shorthand gloss, a convenient cover, for significant connections we didn't yet understand. "But if it isn't?"

"Look," Hertzberg sounded like his patience was beginning to wear. "Mapping the genome is much more drudgery than the public imagines it to be. We make a connection here, trace a sequence there, but discovering what each of 300 billion nucleotides can do is a massive undertaking. So we look for relationships, for patterns of expression in the proteins. But even that is slow, slow work. Most of the breaks come from the other direction -- not in studying how genes express themselves, but in anchoring an already-known expression, like an illness or a maybe a behavioral pattern, to a genetic combination. Like cystic fibrosis, or depression among some of the Amish. And the DNA outside of the genes is doubly harder to understand, because its connection to the phenotype is even more removed -- we've got no known illnesses to tag them to."

"Right, no confessed murders to work backwards from," I said.

"What?"

"Just thinking out loud," I said, "Tell me more about the words on the screen. What'd they say?"

"Well, so far, Klein's the only one who's claimed to have actually produced them on the screen. Chaleff was a good worker, but no genius, and if you want my appraisal I'd say he was exaggerating when he told Jenna--"

"Klein? Who's Klein?" I asked.

"Manny Klein -- Emmanuel Klein," Hertzberg replied. "He's the one who started this special part of the genome project rolling. He discovered the odd chromosomal material two years ago, made the first transformations into binary, and said he eventually got some text up on his screen."

"You don't believe him?"

"Well--"

"Never mind," I said. No point in going over that ground again. "What did the text actually say?"

"Some kind of history lesson," Hertzberg said. "It wasn't gibberish, but it didn't make much sense. Even had a copyright

notice at the end," Hertzberg laughed. "That's why, to be thoroughly frank with you, I keep emphasizing that I have serious doubts that this project will ever pan out. Seems to me a much more likely explanation for what Manny saw on his screen is that his computer somehow dumped some text from another file into what he was working on. It's happened to me from time to time -- I once found part of a very personal letter I had written months earlier right in the middle of a grant proposal I was about to print out and FedEx. Damn good thing I caught it in time--"

"I can imagine," I said. "Where can I get in touch with Klein?"

"You can't," Hertzberg said. He paused for a long second, then spoke in a much lower tone of voice. "Look, I know what you'll be thinking when I tell you this. But believe me, the stroke was entirely natural -- Manny had a long history of them. And the one he got after discovering this chromosome material was, well, very big. He was out like a light. Seventy-one is too young to die these days, but at least he had a satisfying life."

Hertzberg was right about what I was thinking. A death of one young scientist and I guess I had to go with the Lieutenant: it was most likely murder. The death of two scientists, both working on the same project: jeez, I'd been down twisted paths like that before.

Prospects for Jenna Katen suddenly were looking up.

I couldn't say the same for the rest of the world.

"All right. Who can I speak to for more information about Klein?"

"Jenna's your best bet," Hertzberg answered. "She was Manny's research assistant."

Short-lived reprieve for Jenna. The fickle scales of probability were tipping against her again.

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I've always found Neapolitan food to be good accompaniment to the resolution of crises. But I wasn't there yet, not by a long shot. I didn't know enough. I invited Jenna to lunch at Taste of Tokyo in the Village.

I noticed more of her eyes this time. They were an absolutely alluring species of green with flecks of violet. Lucky would be the guy who saw to it that the DNA for those eyes made it into the next generation. But I had more important things to think about right now.

"Glen didn't die of old-fashioned natural causes," Jenna said.

"We agree," I said. "Death by natural causes is a process -- like Michael Baden says -- you see a history, however subtle, of body breakdown that leads to the circumstances of death. Even in heart attacks and strokes. We found no history like that in Glen. Something else was at work there."

"Who's Michael Baden?" Jenna asked.

"Used to be Chief Medical Examiner in New York City. Testified in the O.J. trial."

"But I didn't kill Glen," Jenna said.

"Well, that's the part that, to be straight with you, we're not as convinced about. If Glen didn't die of natural causes -- if the breakdown of just about every major system in his body was triggered by something unnatural, as it almost certainly had to have been -- then the cause of death was accident, suicide, homicide. There are no other choices. We have no

evidence, really, that any one of those three more likely happened than the others. But the guy is dead. You were in the room with him. That moves the needle just a bit into the murder part of the meter, with your shade of lipstick, as they say."

Jenna sipped her green tea. I could see her lips quivering around the edges of the hot cup. They had no lipstick on them. Just soft and pink. "I didn't say Glen didn't die of natural causes," she said.

"But--"

"I said he didn't die of old-fashioned natural causes," she said.

"Meaning?" I asked.

"I tried to tell you in your office on Tuesday," she said. "Somehow the words on the screen killed him. The words that came from the chromosomal material. I'm not sure how -- but that's about as natural a cause of death as you can get -- death by DNA, or more accurately, by transformed DNA-algorithms on a screen."

"Is that what killed Emmanuel Klein?"

She blanched. "He wasn't a young man. Everyone says he died of a stroke."

"What do you say?"

She took another sip of the tea, sucked down a gulp. "He died of the same thing as Glen," she said very quietly.

"And you were there both times -- or at least working, or involved, with both of them, right?"

She didn't answer.

"Look, you seem like an intelligent, sensitive person. I want to help you -- I want to believe you. But you've got to be more open with me. On the face of it, you're in a bad position here. You have a connection with two people who died -- one mysteriously, maybe the other mysteriously too. Cops don't like coincidences -- they're like red flags to us. There's a common denominator here. And I think you know it."

She got up as if to leave.

"Not a smart move," I took her hand. "Believe me, things can get much worse for you, in a hurry." I sighed. I didn't like badgering her, frightening her, but I had to get through to her. "Ok, let's try a different tack. Why'd you lie to me about not seeing anything on Glen's computer screen?"

"You saw them?" Her eyes were wide.

"Just a fading sliver. Why didn't you tell me?"

She sat down heavily, shaken. "It's personal," she said.

"Obviously -- this whole thing is personal. But--"

"No, I mean the words were personal," she said. "I should have told you. I'm sorry. But it was too painful. To think that I-- I just couldn't deal with it anymore on Tuesday. I just wanted to leave. I should have told you."

What was she talking about? A Dear John letter on the screen? That's what she thinks killed Glen Chaleff?

"The chromosomal material that Manny and Glen were working on came from me, from my body. My words killed them. My body's the goddamned murder weapon."

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The sushi and tempura arrived. I looked at Jenna a long time. "So you're saying you're a -- what? -- a carrier of some type of genetic code that when transformed into words kills anyone who happens to read it?"

She nodded. "So far I'm the only one -- as far as I know. The strange DNA material has been found on eight percent of the



X chromosomes we've examined. I told you that. But so far mine's the only one that's been translated all the way into English words."

"How'd you get involved in this to begin with?"

"Manny -- Professor Klein -- first came across the special DNA in a graduate student at MIT. Standard procedure -- lots of students give DNA samples for this kind of research. I'd already given some of mine out at CalTech. Manny put out a request on the Internet -- hundreds of scientists around the world were on his list, each already had DNA samples from hundreds of students and locals. Mine came up positive -- the special DNA is easy to spot once you know what you're looking for. I wanted an excuse to come back East. I got in touch with Manny and asked if I could join his team. He said sure. He was that kind of man. If I'd known that my DNA would kill him I'd have taken every bit of it back and grabbed the next plane to Antarctica. But even after he died I wasn't sure. I mean, people get strokes. But now it's happened again. This -- this insanity in my DNA has killed two fine people!" She slammed her fist on the table. The tea in the cups shimmered, along with the tears brimming over her eyes.

I put what I hoped would be a consoling hand on hers. "Have you spelled this out in detail to Hertzberg? Why hasn't he stopped the project?"

"You've talked to him, right? You know what he's like," Jenna said. "He's an Occam's Razor man -- he goes for the simplest explanation. He's comfortable with thinking Manny died of a stroke. He'd probably rather believe that I killed Glen with a chemical that left no trace than Glen was somehow killed by the words on the screen. He'll always pick the mundane rather than the exotic. He's a classic example of Kuhn's workaday scientist -- don't rock the current paradigm, milk it for all it's worth."

Yeah, that jibed with the impression I already had of the man. Would take a few more bodies in his face before he'd take notice -- and by then who knows what kind of genetic demons would be let out of the bag.

"Look, we're really talking in the dark here," I said. "Any chance you made a copy of the, uh, offending words, so I could see what they looked like?"

"No," she said. "They're too dangerous -- they already killed two people, for God's sake. I don't want to take the chance--"

"All right," I said. "I understand. But can't you at least summarize the gist of what they say, so I can get some idea of what it is you're talking about?"

She considered, then nodded. "First you scan the exact chemical composition of the chromosomal material. We use a new kind of polyacrylamide to do the electrophoresis, the imaging, if you need to know. Gives an extremely clear image, especially good for small nucleic molecules. And the results, as you know, fall into a clear binary series. Then you transform that series to an ASCII table -- and in Manny's case, in Glen's too, they got words..."

"Right. First the Indo-European proto-language, Hertzberg told me, then the tenuous English translation."

Jenna nodded.

"And the translation said?" I asked.

"It comes out to about three paragraphs--"

"Paragraphs?"

"Yeah," she said. "Paragraphs. There was a small amount of null material between sentences, and larger amounts after three groups of sentences. So we called them paragraphs."

"Ok," I said. "Sorry for interrupting. Please go on."

"Well, the sentences talk about how intelligent species can leave their marks in history. How some, like the human species, have left some of their marks in stone, and these have survived. And how these could be easily recognized by other intelligent people -- or species.

"We're not really clear whether the word in that paragraph is species or people.

"Then the text continues with what looks like a question:

"But what of species who lack the capacity to work in stone, to leave their records in unchanging media? How might they tell the future about their existence? They might try to leave a marker, a message, in a different kind of stone, a living stone, a medium -- a medium over which they had power.

"And the notation of life -- as the text seems to put it -- was their medium. They must've had the capacity to penetrate our DNA, maybe re-arrange it, and leave this message.

"And the message says it will be passed on from generation to generation, without knowledge of the bearers, and it will therefore last longer than any message carved in non-living stone."

I whistled.

"Wild, I know," Jenna said. "I mean, there are lots of individual words in there that we're not completely sure what the meaning is, but that's our best estimate as to the general sense of it."

"So what are we talking about here? Intelligent pieces of viruses that can penetrate our chromosomes, our DNA, and leave messages for us? Intelligent aliens who were able to perform genetic engineering on our ancestors, and leave their calling card in case we had further business?"

Jenna made a helpless gesture. "That, and every possibility in between," she said. "I don't know. I didn't say they were viruses. I just said that was the thrust of the message they left -- in me. I saw it. Twice." Her lips were quivering again.

"All right," I said, and tried to give her a reassuring smile. Though I didn't particularly feel that way. "And was that all there was? That was the entire text on the screen?"

"That's the substance of the message," Jenna said. "There was something more at the end -- a sort of notice I guess."

"Tell it to me," I prompted.

She closed her eyes, as if trying to get these words exactly. Apparently she felt they in themselves posed no threat. "Anyone who reads these words, who possesses our codes, is free to use them. As allowed under our Copyright Notice."

"Copyright Notice?" So there it was. I was glad Jenna was at least being honest with me.

She shrugged. "That's what the ASCII translation table printed out in English. The newer approaches try to go for figurative rather than literal translations where possible -- they convey the culture with more flair, though increase the likelihood of error. The proto-Indo-European was closer to Proclamation of Possession, or maybe Announcement of Ownership Privileges -- I've become an expert on that damn language, already, believe me. Truthfully, we didn't pay all that much attention to that last part. The stuff in the body of the

message seemed much more important."

"Hard to believe that some non-human intelligence would share our notion of copyright," I said.

"Harder to believe they could create a code that could be rendered into something that looks anything like Indo-European, and store it in some of our chromosomes," Jenna said. "But there it is. And the sense of property, possession, is very old, biologically."

"You mean like mice pissing -- urinating, sorry -- to mark their territory?"

"Right," Jenna may have smiled, first time. "And hamsters mark stones near their dens with secretions -- ethologists say scent marks are chemical property signs. It's all over the natural world. Birds, fish, even insects mark and defend their property. And the closer we come to human beings, the more abstract the notion of property becomes. Monkeys, baboons, chimps have all kinds of very complex expressions of property, aggressively excluding this or that member of the troop, family, whatever from the privileged circle of users."

"So maybe the authors of your text were human," I said.

"Well, could be," Jenna said, "And who really knows what people -- any species -- were really capable of seven or eight thousand years ago."

"That's the first sign of Indo-European in human history?" I asked.

Jenna nodded. "Nostratic supposedly goes back even further -- more than 12,000 years -- and has some resemblance to Indo-European, but its existence is still hotly contested. Anyway," she took another sip of tea, with steadier hands this time, "the chromosomal algorithms print out like Indo-European, or something very close to it."

"How do we know the linguistic DNA wasn't inserted into the genome more recently?" I asked.

"We don't -- not for sure," Jenna said. "But the eight percent of X chromosomes with the odd material comes from people all over the world, many way off the track of usual scientific research. Doubtful that an insertion of recent vintage could have that kind of in-depth dispersion. No, I think we're on reasonable ground assuming that the authors of the text, whoever or whatever they were, were contemporaries of early Indo-European. Our problem then becomes how to account for such early people -- if they were people -- having any sort of gene-insertion technology. But like I was saying -- like the message itself says -- all we really know of the distant past is what has come down to us in obvious long-lasting media like stone, bone, petrified wood. People in Asia probably did things that would surprise us in bamboo, but all that's disintegrated now. I don't find it impossible to consider that some early human group, speakers and writers of an Indo-European root language, found a way to manipulate DNA. Even non-literate groups show enormous sophistication in deliberate breeding of animals and plants. And if our Indo-European gene-authors could do that, inserting a message that could play out on today's computers doesn't seem impossible either -- DNA and computer codes operate in similar ways, both prescribe patterns of organization. Adleman's already demonstrated that DNA in a test-tube can be used to compute solutions for mathematical problems. And they just had to do it once -- encode their message into DNA and attach it to the X chromosome just once -- all it required was one fluorescence of their culture. The

knowledge to do this could have come and gone all in one or two hundred years. And after that the natural process of DNA replication would see that the message would live on and on. That's the beauty -- and the horror -- of it. We have in DNA the most effective of all known replicative devices."

"Your perception is impressive, for someone--"

"For someone just a few years out of grad school? For someone so young? Not really. This is my life. I guess in more ways than one."

"I know," I said. "That's the problem with most of these quests to understand who we are, where we were, where we're going, isn't it? Sooner or later all the fine science boils down to lives at stake." I closed my eyes, opened them, focused entirely on Jenna's face. "Until we can relate what that prehistoric Stephen Jay Gould or whoever wrote, connect that to Glen Chaleff's body falling apart, maybe Manny Klein's too, your life is the one at stake here in the short run. Doesn't matter how appealing your DNA-to-Indo-European-ASCII hypothesis is, the cops won't care. They'll come after you for Chaleff's death. And in the long run..." I shuddered, "well, if something in those words killed Chaleff and Klein, then who knows how many others are at risk."

"You believe in my work, then?" Jenna asked, for an instant more pleased to have an ally in her adventures in knowledge than frightened about where that knowledge might be taking her.

"Let's just say I have a very open mind." But the truth was my mind was set -- on finding a way out for her.

"Two people are dead," Jenna said. "There has to be a connection."

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The Lieutenant informed me the next morning about a connection that didn't work to Jenna's benefit at all. "Chaleff was dipping the wick with a blonde. Going on for at least a few weeks. Three witnesses saw Katen throw a glass of wine in his face and scream at him about it at a party week before last. There's the motive."

"Yeah? And how exactly did she do it? With a magic wand?"

"That's for you to find out, Doc."

I called Jenna and asked if I could come over. She lived in a new highrise in the West Village. She obviously had money.

Her face flushed when I told her about the witnesses at the party. "So what?" she said. "Lots of people fool around, lots of people scream and yell at each other. Doesn't mean I killed him, for crissakes."

"I'm more concerned that you didn't tell me," I said.

"What? You want a complete exposition of my life? You want a calendar of every fight I had with Glen?"

"No," I said. "Look, this isn't going well for you. I tried to tell you that yesterday. Cops are like hounds moving in concentric circles -- once they get a sniff of the quarry, they go round and around, tighter and tighter, until they close in totally and arrest you. And don't believe the movies and TV shows -- once they arrest you your chances are not very good. You're near the pit now. You've got momentum against you. We've got to come up with some sort of evidence of what you're talking about, soon, or the situation may be out of my control."

"What kind of evidence?" Jenna asked. "I've already told you what I know."

"Real evidence," I said. "Not just your rendition of the

words on the screen. I'm talking about firing up your computer, putting a disk with a binary map of the chromosome stuff in the drive, running the ASCII/Indo-European transformation, and videotaping that whole process including everything on the screen."

"And then what? Running it on HBO as America Under Cover and killing the millions of people who watch it?"

"Well, if it came to that, I could probably get some prisoners on some death row to volunteer to read it, but I don't think reading it can kill anybody."

"Why not?" Jenna asked.

"Well, for starters, you obviously looked at it and you're still alive. And I saw the words 'Copyright Notice' and I'm still in peak condition."

"That was just one phrase," Jenna said.

"Of course," I said. "But your survival and my survival certainly suggest that whatever's going on with the text, just reading it isn't ipso facto lethal."

"So where are you headed then? Back to proving by process of elimination that I killed Glen?"

"No, I don't think that either. All I'm saying is that something more than just looking at a screen is the culprit here."

"What, then?" Jenna asked.

"I have an idea," I said. "But first things first. Can your computer handle the ASCII transformation?"

Jenna nodded.

"I assume you have some of the binary codes from your, ah, biological system available on disk?"

She nodded again. "I already have the Indo-European proto-language rendition of my DNA message on disk. Part of this phase of the research was to see if more than one programmer could come up with the same English words independently."

"Ok. Then all that needs to be done is the final translation into English. I brought this new little camcorder along with me from my office -- I can set it up right there in the corner." I slipped the three-pound wafer out of my briefcase. "How long would it take you to get the words on the screen?"

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Jenna was hunched over her computer, totally enmeshed in her work. She jabbed a key and leaned back, hands clasped around the back of her neck. "About 7/8ths complete at this point," she said. She had that look of total satisfied absorption I'd seen many times in faces of researchers.

"Good. The camcorder's all set to record, the printer looks good too." I fiddled with the paper tray one more unnecessary time. Paper -- marvelous invention. I didn't like the tendency of those words on the screen to fade, and I never put one hundred percent trust in any camera. A paper printout was just the ticket to give me a reliable permanent record of those words.

"You're sure you want to go through with this?" Jenna asked, her expression suddenly changed. The larger realities apparently were still very understandably pressing her.

"I'm sure," I said.

"You know it's possible that the reason that I read it, and haven't been harmed, is that the DNA source code is mine..."

"Possible, yes. Lots of things are possible. But I think

the key point here is that Manny and Glen did something more than read it. I can't imagine that just reading some words on a screen could kill--"

She shook her head. "I really don't think we should go on with this."

I could see she was working herself up--

"I mean," she continued, "even from my selfish point of view, if you die here, with me right next to you, there'll be no way the police won't believe that I killed you. And even if that wasn't the case, I don't want you to die--"

"I've already taken care of that," I said. "I left an outline of my theories about this case in my desk before I came here today. If something should happen to me, the Lieutenant will read that and you'll be in the clear. You've got to trust me on this."

"I do trust you," Jenna said. "I like you -- that's why I don't want you to die. I mean--"

"No one's going to die," I said. "I'm not going to be sitting there staring at the screen like a wide-eyed lamb when the words come up. We'll be in the other room. The video recorder will start automatically. The words will print out on the laserjet. Whatever killed Glen and Manny, it surely wasn't the meaning of the words -- you've already recited that to me -- it had to have been some kind of energy that was generated from the computer, released somehow along with the words. I've been saying that I don't think that just reading the words released that energy -- I don't see how it could. But even if it did, there's no way that energy could be carried along to a simple printout on paper."

Jenna still looked doubtful. "What about the video tape?"

"We won't look at it directly -- I'll use the digital scan to confirm that something was in fact recorded, then get it over to the lab for further testing."

"I don't know," she said.

"Jenna, I'm appealing to you not only as a woman who may need this evidence to save her own freedom, maybe even her life, but as someone who cherishes the pursuit of knowledge. You and your colleagues started this. Who knows what lessons this DNA message may ultimately hold for the human species? We've got to see this through."

She sighed, shaking her head, but she swayed back to the computer. I could see her body, first limp and sagging, now energized and vibrant as she returned her full attention to the work on the screen. "We should have the text up here any minute now," she said. "The program will beep 30 seconds before the words all become clear on the screen, so that'll give you enough time to get into the next room. Don't be like Lot's damn wife -- make sure you don't turn around and peek at the screen."

The camcorder clicked and whirred into action.

The phone rang. "Should I get it?" I asked.

Jenna motioned yes.

"Hello? D'Amato. Phil. Fine, thanks. Uh huh. I see. Jeez -- How? Ok. I understand. Of course I will. I'll be back to you."

The computer beeped. "Words are on the screen in 30 seconds," Jenna turned and announced with a mixture of triumph and trembling.

"That was Hertzberg on the phone," I said.

"What's he found? Anything of interest?" Jenna rose from her chair.

"Someone else on the project died -- of `natural' causes. Denise Richter. You know her?"

"Of course I know her," Jenna sobbed like someone stuck by a knife. "Of course I do. I didn't know her well but -- for God's sake, how'd it happen this time?"

"Same as the last two," I said. "At least you're off the hook now on the murder charge."

"Oh God. I just thought of something."

"What?" I said.

"Denise was using my genetic material. Glen told me the batch she'd been working on had been accidentally ruined -- the stain was too strong -- so he sent her some of his stock, which was mine... Oh god." Now not only her lips but her entire body was quivering.

"It's ok," I said, and I put my hand on her shoulder to calm her. "Hertzberg's putting a halt on the project. That's why he was calling you. I guess he has the requisite number of bodies now--"

"And I'm gonna put an end to this," Jenna cried out, and I saw her hand reach down to the keyboard.

My hand shot out in reflex, faster than Jenna's. I caught her wrist in midair, jerked it away from the keyboard. "Don't," I said. "We've got to go through with this."

"Are you crazy?" she screamed. "How many more dead do you want?" And her fists were pummeling my chest, unclenching into hands that were frantically trying to push me away, break free so she could get to the keyboard and prevent the words from getting on the screen, maybe erase all the crucial preparatory work on her hard disk as well.

But I set my arms firmly around her body and moved her out of the way. And I had a clear view of the screen.

And God help me, I couldn't stop myself.

I looked and read.

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Jenna's voice came to me and said, "Are you ok?"

The words on the screen were as Jenna had described them in the restaurant. Down to that peculiar copyright notice that I had seen a fragment of in Glen Chaleff's apartment, and Jenna had quoted verbatim to me in the restaurant.

"Anyone who reads these words, who possesses our codes, is free to use them. As allowed under our Copyright Notice."

"Are you ok?" Jenna asked again. "How do you feel?" And I could see she was staring at me intently.

"So far, so good," I said. "Just the usual hunger rumblings in my stomach."

Jenna continued to stare at me, as if keeping me in the crystal clear focus of her green violet eyes would prevent me from dying.

"I'm ok, really," I said. "I'm sorry I had to shove you out of the way." Actually, my body wasn't -- she'd felt very good with my arms around her. But that was hardly the point.

"Oh God," she put her arms around me and pulled herself close. Professional, think professional, I thought. She's still officially a subject in a murder investigation, though I knew she wasn't guilty. I controlled myself to the point of allowing myself just one or two strokes of her soft brown hair. "I'm so glad you're ok," she said, crying. "What am I? Some sort of goddamn Typhoid Mary of an ancient genetically engineered curse?"

"No," I said. "This isn't a disease -- even though I said virus the other day. I mean, it could be a virus, it could be

some early advanced variant of the human species, hell, it could be aliens from outerspace like I said. The point is that whatever, whoever rigged this booby trap, was an intelligence. And disease isn't intelligent. Deadly sometimes, yes. But not intelligent. And this isn't a curse either. We're dealing with fact here, hard science, not magic -- something in your DNA. And that's about as real a reality of life as you can get. You know that."

"But what's the booby trap?" Jenna asked, pulling herself away and drying her eyes. "You're still alive. Even though Manny and Glen and now Denise..." She shook her head.

"The answer has to be in the words on the screen -- the last two sentences if I'm right. The words of course are not exact -- how could they be? Hertzberg says you have no way of confirming the accuracy of the transformation. He's right in terms of the usual modes of linguistic confirmation. They can confirm the accuracy of the Indo-European to English part, but not the initial chromosome-ASCII to Indo-European part. How could they? It's never been done before. We're in a technological variant of Plato's Meno paradox here -- you have to already have knowledge to recognize, to validate, potential knowledge, so where does the first knowledge come from? But the chromosome ASCII looks like Indo-European -- not like Chinese or Korean. So, ok, it may just coincidence, like Hertzberg thought, but let's assume it is Indo-European, or related to it, and proceed from there. Where does that lead us? Hertzberg says there's a high noise component. But no reason to think it's evenly distributed throughout every word in the message. Some of the text on the screen may be way off from its original meaning, some may be right on the money. How do we tell which is which? What does the evidence suggest?"

Jenna held her hands up in an I-don't-know gesture.

"Well," I continued, "we've got three fatalities now as evidence. What part of the text could they possibly relate to? I don't see anything in the history lesson, fascinating as it is, that could be the culprit. But I do see a possible suspect at the end -- in the copyright notice. 'As allowed under our Copyright Notice.' Let's assume the noise in that section of the text is low. Let's assume that Copyright Notice, or something close to it, is an accurate rendition. Now: Seen in that light, maybe the deaths make sense as punishment for what's not allowed under their notions of property."

"What's not allowed under copyright?" Jenna asked. She cast a sideways look at the screen. I followed her gaze. The words were mostly gone now.

"Let's think about what is allowed, first," I said. "The text says it's all right to 'use' the words, or maybe to use the 'codes'. What does that mean? How do we use printed words?"

"We read them?" Jenna asked.

"Yes," I said. "And that seems to be ok -- at least for me. I read the words and I'm ok. And I have no special connection to these words. They didn't come from my chromosomes."

Jenna nodded and looked at me, still not completely convinced that I would be ok.

"All right," I said. "So let's get to the 'codes'. How would we 'use' genetic codes?"

"Well, the most common way is we have sex, reproduce, and the codes create new versions of us. And the codes within our cells create new cells, as long as we're alive."

"Right," I said. "And that seems ok too. I mean, people



reproduce all the time, right, and few seem to die of mysterious natural causes. Most people's cells reproduce ok too, for at least most of their lives. For that matter, Adleman used real DNA codes for his computations -- I pulled some summaries of his work off the Net last night -- -- and he's all right. Though presumably he didn't use yours."

"True," Jenna said, not in any mood for my humor. "So where does that leave us?"

"Where it leaves us is at a clearer answer to the question you just asked: What do those words on the screen forbid? Not reading the instructions. Not implementing the instructions -- not implementing the genetic codes. Those things are ok. We're 'free' to do them. We can use the words and the codes. But what is that Notice saying, in some sort of implicit way, that we can't do? What does a copyright notice seek to protect against?"

"Plagiarism? Theft of intellectual property?" Jenna asked.

"Yes," I said, "but those wrongs seem too subtle for what's going on here. The proscription has to be against something much more basic -- more common. Something that Klein and Chaleff and Richter all did, no doubt in all innocence. Something that people do almost without thinking with computers all the time."

Jenna held her hands up in frustration. "What?"

"Do you have a way of automatically making a copy of a file on your computer? You know, giving the command to copy in some sort of delayed way that would allow us to walk out of the room while the copying was taking place -- rather than staring at the screen, or being anywhere near it?"

"Well sure," Jenna said. "I can put the copy command at the end of a command chain -- a long chain -- that would definitely give us time to get out of the room. But--"

"OK, well could you do that right now then -- for the chromosome text on the screen and its underlying program?"

"You think that making a copy of this triggered everything off?" Jenna asked, disbelievingly. "Making a copy killed Glen and Manny -- and Denise?"

"Well, it's a copyright notice, isn't it? And making copies is precisely what DNA is all about."

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She entered the delayed command string in the computer, and we walked quickly into the next room. I told her not to look anywhere near the computer screen. We looked at the opposite wall -- at the hand-me-down shadows of Plato's cave, like dogs baying at the moon -- and saw nothing. No effect at all. A brief play of light on the blue wall, like heartbeat of a photocopy, maybe, and that was it. The paint didn't even so much as peel.

But the camcorder, which presumably had been recording all this time, made a sharp whining noise and flashed an erratic red light. I turned it off manually, and did a digital scan of the tape. "Goddamnit. That pulse or whatever it was must've erased the whole tape. We've got nothing here."

"What now?" Jenna asked, very tiredly.

"We call in the mice," I said.

A half hour later, my friend Johnny Novino from the Berg Institute at the NYU Medical Center -- an animal research lab -- arrived with a cartload of white mice.

"What are they for?" he asked.

"You wouldn't believe me if I told you, so I won't," I

answered. "And I'd rather you didn't know anything beforehand, so you can conduct a completely unbiased examination if need be."

"Figures," he said, gave Jenna a wink, and he left.

We set up a pair of mice in a cage in front of the screen, and Jenna entered the delayed copy command. We hurried out of the room, and saw the same light kiss on the wall.

But for the mice, it was the kiss of death.

We repeated the act ten times, and produced twenty dead rodents.

"Was that really necessary?" Jenna asked.

"Yeah," I said. "I don't like this anymore than you, but we've got to have redundancy to really pinpoint the exact cause of death here. Better them than us."

"Poor little things couldn't even read the damn text,"

Jenna said, then rushed into the bathroom and threw up.

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The lab report came back five days later.

"Phil, you know about circadian rhythms?" Johnny returned my call about the report.

"Well, as much as the next guy," I said. "They control our waking and sleeping patterns, and are governed in some way by light. They seem to affect the brain's sleep center through the optic nerve."

"That's right," Johnny said. "So what seems to have happened to your little mice is some stimulus, likely some kind of light, switched their circadian rhythm to infinite awake -- as in impossibly high blood pressure, instant heart failure, instant everything failure, adios muchachos."

"And your evidence for that?"

"Like the report says," Johnny replied. "Incredibly high residues of serotonin -- natural chemical found in the brain, contributes to the sense of wide awakesness, well-being, also raises the blood pressure."

"So at least the mice died with a smile in their hearts," I said, and filled him in on all the details.

"Jeez," Johnny said. "Likely Glen Chaleff died of that too, then. But your guys must've missed it because serotonin's a natural compound, on no one's list as an abused drug. We missed it too on the first six mice. But there's no doubt about it now. So my best guess for the full trajectory -- assuming you didn't administer serotonin to the mice yourself -- is light provokes extreme circadian reaction, causing huge overdose of serotonin, causing lethally high blood pressure, causing heart attack and general system failure across the board. The only real mystery here is what the hell kind of light could do that?"

"We're working on it," I said.

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"But how could a people eight thousand years ago know how to make our current computers emit a fatal light?" Jenna asked over dinner at my favorite Italian restaurant the next evening.

"I don't know," I said. "But that's no more a puzzle than that they could insert a special binary code in some of our chromosomes that could read out ASCII Indo-European -- and you've been willing to believe that. We don't understand the relationship of electricity to light in anything like its entirety even now. Maybe they did -- or at least knew something we don't yet. Maybe they had some kind of organic computers -- that ran on DNA algorithms like Adleman's math calculator -- except rather than solving equations they caused electrons to

form light patterns that in turn controlled circadian rhythms."

"Lots of primitive people understand circadian rhythms," Jenna said. "I can believe that. And the DNA computers--"

"Rotted away," I said. "Or maybe they're in us. Who knows."

"Their media were life and light," Jenna said, "more ephemeral, but also much more lasting, than just plain stone."

And the red wine came and we both got good and drunk...

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Some things are too bizarre for me ever to put in a public record -- not if I want to keep my job.

Hertzberg called an end to that small project within a project, but Jenna's going on. She and I contacted all of the original researchers, explaining our theories to them. Most thought we were nuts, a few believed us. Doesn't matter if they believe us or not -- the important thing is that those who pursue this aren't likely to risk making a copy of the text any time soon. We can't do anything more than alert them -- to the enormous possibilities of this research as well as its dangers. The rest is up to them.

The problem is we don't have any evidence. Videotapes, motion photography -- all equipment seems to be blind to that deadly little light, able neither to transmit nor record it. We can make no record of what happens when Jenna's chromosome text is copied, no record of that thin bright thread that's emitted. Puts a crimp in any research program.

And we of course have no copies of the text. Videotapes, photographs of the screen, endless printouts -- they all come out blank too, as innocent of DNA and Indo-European as the driven snow. The lethal light hadn't erased the video-recording that first time; the recording hadn't occurred to begin with.

"What kind of words can appear on a computer screen and defy recording, printing, on any other piece of equipment?" Jenna had asked.

"Maybe the kind that kills you if you try to copy them," I'd replied. "Maybe the words don't really exist on the screen at all. Maybe the program somehow projects them right onto our optic nerve."

But the corpses existed all right. Three good people, and a pile of who knows how many rodents now. They, ironically, were the sole proof that the ASCII derived from the DNA not only looked like Indo-European, but was Indo-European or something much like it -- stark confirmation that at least some of those words meant what they said. Jenna thinks that might be enough to give us a shot of getting something published, maybe in one of the fringier scientific journals.

We -- Jenna -- stumbled upon something, yes. A primordial copy protection scheme. A copy protection technique from Hell. DNA as ultimate shareware: use this little program to your heart's content, enjoy it, be fruitful and multiply with it, implement it -- let it implement you -- but don't copy the words without authorization. Not unlike many of our own computer programs -- and books -- really. Except authorization to copy the Indo-European DNA text has likely been quite impossible to get for something going on eight thousand years or more.

I guess I was able to see this when Jenna didn't because, well, my job is always at the intersection of science and the law, of life and property and the canons for its protection. And this canon was effective, I'll give at least that to its authors.

Who were they? They apparently left their message in in the far reaches of some eight percent of human X chromosomes, their precious copyright notice in who knows what fraction of those. Maybe they were in some way responsible for setting the human species on the course it took.

Why would they attach such a deadly penalty to a violation of their notice? In that they were no different than organisms throughout the animal kingdom ready to protect their turf by deadly force. Jeez, didn't I read just last week that even some trees emit a resin that kills any insects that trod too heavily on their bark.

Only further research will tell. And that, obviously, Jenna and her colleagues will have to be do exceedingly carefully. Like they were researching a deadly new virus.

In the meantime, we'll just have to take what pleasures with our DNA we more or less safely can. Those we are "free" to enjoy...

I ran my hand against the skin of Jenna's back. She lay sleeping on my chest. She'd been cleared of all charges -- Denise's death had seen to that -- she was no longer a suspect in any way.

I often wondered if somehow hers was the only one of the eight percent of the X chromosomes that not only had the binary DNA material, but the DNA that yielded that brief meditation on modes of preservation, along with the copyright notice. Not likely, I guess. Further research would answer that question too.

But in the meantime, the sensible course would be to assume that Jenna was the only one. She was the only one we knew about. And if that was so, then my responsibility to the human genome, the human species, was to see that Jenna's special DNA survived. Not only in frozen storage, which Jenna had already taken care of, but in actual in situ living usage -- the far more reliable and time-honored way of getting DNA into the future.

I of course knew, in spite of what I had told her that day in her apartment when we'd first glimpsed the light, that what she carried in her DNA was indeed both a blessing and a curse -- a blessing in terms of the knowledge about our very origins that it could hold, a curse in terms of the price that three unknowing people had already paid in quest for that wisdom. A mechanism of beauty and horror, as Jenna had said herself. But to the degree that it was a blessing, I had to help it survive.

Yes, until further research could sort all of this out, I was willing to do my part to insure that the text she carried was passed on to future generations in its original form, where minds wiser than ours might come to better understand it, plumb it for its secrets, and neutralize its deadly penalties.

After all, the lethal qualities of the DNA she carried didn't extend to reproduction. That, the copyright notice said, she was free to do.

I was prepared to help her do just that.

I moved my head over and kissed her face.

After all, I was a forensic scientist, but a scientist first, and though I'd pretty much reached the limits of my capacity to contribute to the ongoing research here, that didn't mean that I'd shirk my responsibility to help the subject of the research live on.

That, and I so enjoyed looking into Jenna's green violet eyes when they were happy...

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