The Diamond Drill

CHARLES SHEFFIELD

Charles Sheffield (1935–2002) , physicist and writer, was born in the UK, but lived in the U.S. after the mid-1960s. In 1998, he married writer Nancy Kress. Sheffield began publishing SF in the 1970s, and quickly gained a reputation as a new star of hard SF in the tradition of Arthur C. Clarke. He in fact wrote SF of all descriptions but always with a positive view of scientific knowledge as a tool for solving problems. Sheffield was a prolific novelist, averaging more than a book a year. His novel Spheres of Heaven (2001) is a sequel to The Mind Pool (1993). He had two books out in 2002: Dark as Day, a sequel to Cold as Ice (1992), and The Amazing Dr. Darwin. His short fiction is collected in Vectors (1979), Hidden Variables (1981), Erasmus Magister (1982), The McAndrew Chronicles (1983), and Georgia On My Mind, and Other Places (1996). He also wrote Borderlands of Science: How to Think Like a Scientist and Write Science Fiction (1999).

"The Diamond Drill" is from Analog, and is one of the last pieces from this clever, energetic writer, who died near the end of 2002. The central character is a smart man and proud of it, and uses his wit and knowledge to gain advantage. Charles Sheffield's amused, intelligent narrative voice is here personified in the central character. Not a word is wasted. Sheffield cared about science and science fiction, and we will miss him and his engaging stories.

I doubt if there is a human being alive who said, as a small child, "What I want to be when I grow up is a tax inspector."

That includes the Customs official (Customs are just another form of taxation) who had just pulled me out of line with a discreet, "If you wouldn't mind, sir."

"What's the problem?" I had been headed for the NOTHING TO DECLARE exit.

"Your luggage. You are Dr. Purcell, arriving from Pavonis Six?"

"I am." I read his badge. "What can I do for you, Mr. Warren?"

"Are you aware, sir, that the import to Earth of diamonds, alien artifacts, and life-forms from Pavonis Six is strictly forbidden?"

"I did know that, yes."

"Then what about these, sir?"

We had entered an official chamber off the main entrance corridor. There, open on a table, lay my suitcase. Beside it sat a large leather pouch, also opened to reveal a bright glitter from within.

I laughed. "Oh, I see why you are worried." I put my hand into the pouch and pulled out a handful of faceted stones that seemed to catch and refract every ray of light in the room. "These are stage jewelry, Mr. Warren. They look much like diamonds, but they're not. I picked them up very cheaply, practically for nothing. If you like, I can show you the receipt."

"I think, Dr. Purcell, that we would rather obtain our own assurances as to their nature." He stared at me, but my easy confidence must have somewhat persuaded him of my innocence, because his voice was more friendly when he said, "I presume you would not object to our conducting our own tests—nondestructive ones, of course."

"Not at all." I quickly poured the handful of stones that I was holding back into the pouch and held it out.

“I hope this won’t take too long—I do have appointments.”

“It will be very quick, sir, just a few minutes. We now have a fully automated procedure.” He said that with a slight air of pride.

“A machine?”

“That is correct. This machine.” He walked across to a compact unit maybe half a meter on a side. “It is designed specifically to establish if a stone is a diamond, or some other material.”

He emptied the pouch into a hopper on the top, and the stones vanished into the interior.

“Fascinating.” I leaned against the table. “If it’s not some sort of trade secret, I wonder if you would mind telling me how it works.”

“Not at all.” From his tone I could tell that he was delighted to talk about his department’s latest toy. “How much do you know about diamonds, sir?”

“Enough to know you can’t buy them for the price I paid for those stones. Oh, and if it will scratch glass, it’s a diamond. Right?”

“Actually, sir, that’s wrong. Diamonds are the hardest things found in nature, but many other gemstones, such as rubies and sapphires and topazes, plus many manmade materials, will scratch glass. You would be safer to state it the other way around: If it won’t scratch glass, it’s not a real diamond.”

“So I know even less about diamonds than I thought. This machine tests hardness?”

“It does. It also tests for density. Diamonds have a density of about 3.5 times that of water. Zircons—a very common ‘fake diamond’—are much denser, at 4.6 and 4.7. So are rubies and sapphires at about 4.1. Glasses are much less dense.”

“I suppose the machine tests everything for densities?”

“Indeed it does. But that’s not all—colorless topazes have almost exactly the same density as diamonds, so we have to consider still another test: of refractive index.”

“How much the stone bends light?”

“Exactly. Diamonds have a very high refractive index, at 2:43, which accounts for its brilliance. ‘Fake diamond’ candidates run over a wide range of refractive indices, from clear quartz at about 1.5 to zircons at 1.97.”

“And I suppose this marvelous machine tests that, too?”

“Indeed it does. Only if a stone passes all three tests—hardness, density, and refractive index—can it be a diamond.” The machine at his side beeped gently and disgorged a heap of glittering stones into the pan at its bottom. “And yours didn’t pass all the tests. Whatever these are, they’re not diamonds. I hope you didn’t pay too much for them, sir.”

“Oh, I don’t think so.” I picked up the pan and emptied its contents back into my lead-lined carrying pouch. “Is there anything else, Mr. Warren, or am I free to go?”

“That’s all, sir. Welcome to Earth, and I hope that you enjoy your stay here.”

“I’m sure I will. And I guess I won’t be going near the diamond merchants.”

We both laughed. I placed the pouch containing dozens of pure diamonds back in my case, nodded to him, and headed for the exit. The Customs staff were of course free to question me about other matters, but human psychology being what it is, there was no chance of that. Their infallible machine had assured them that despite the anonymous tip (provided, of course by me) Dr. Purcell was not a diamond smuggler, so it was remotely unlikely that he would be smuggling anything else.

The trouble with machines, of course, is that they do what they are built to do. They lack the human talent for suspicion or the power to notice that, although a stone failed to pass all their tests and could therefore not be a diamond, there was still something highly odd about the results of these particular tests.

My diamonds had satisfied the hardness test and the refractive index test, but they had all failed the density test. Their density, rather than being 3.5, would have measured 4.1. All diamonds are pure crystallized carbon, and these were no exception. But nothing like these diamonds had ever been found—or made—by humans. Ordinary diamonds consist of the commonest form of carbon, carbon-12. These were pure carbon-14, a more massive and slightly unstable isotope with a half-life of 5,700 years. If the Customs' Department machine had possessed a suitable test, it would have discovered that the stones were radioactive enough to glow feebly in the dark.

I was telling the exact truth when I said that I would not be visiting the diamond merchants. My target is the big industrialists. The chance to experiment with and explore an alien artifact is worth thousands of times as much to them as any gemstone in existence.