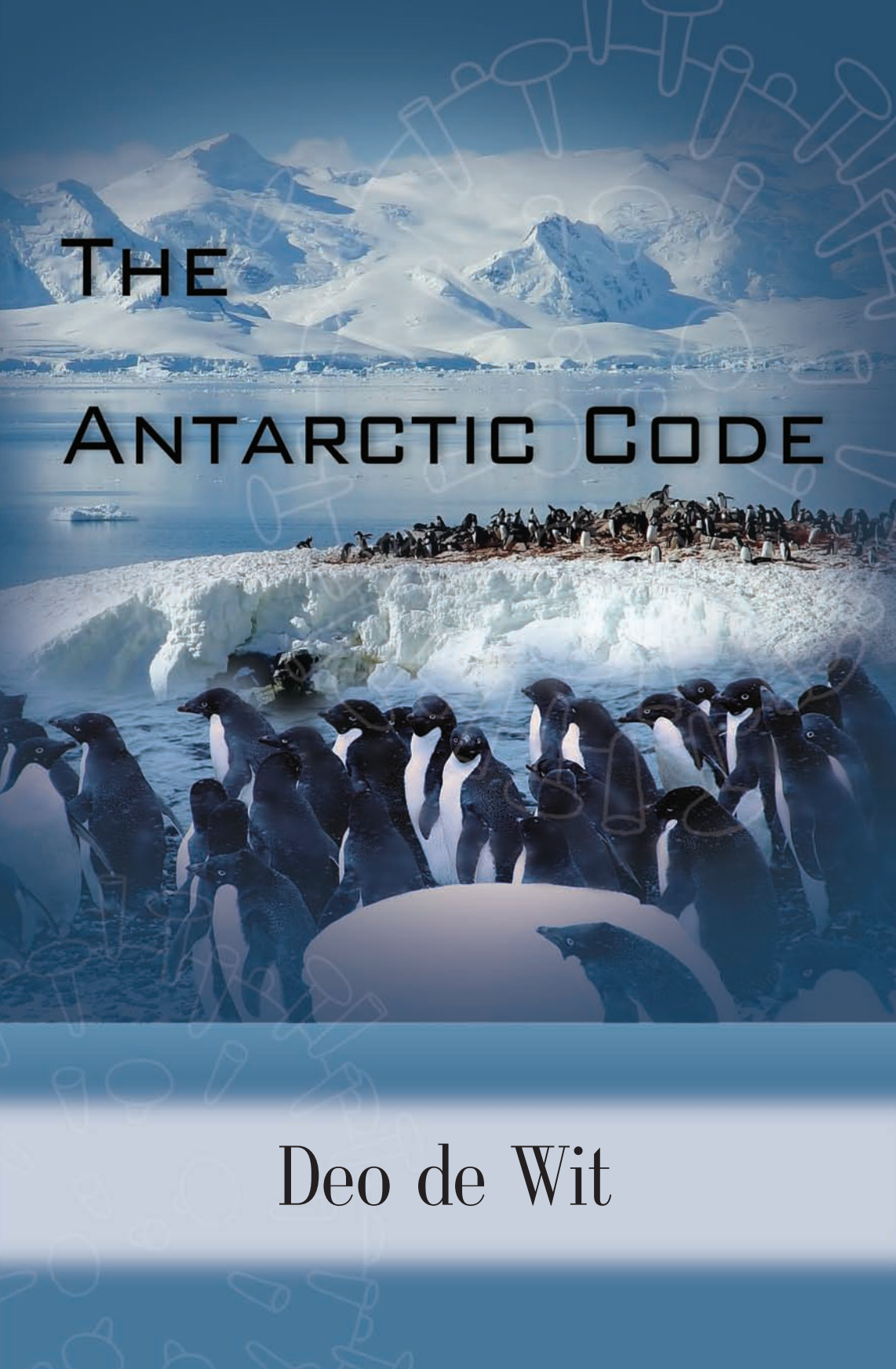


Scientists discover an unusual influenza virus in an Adélie penguin colony in Antarctica and attempt to unravel the genetic code responsible for its unusual properties. The story then tracks the lives and interpersonal relationships of three Californian siblings - a female detective, a male research scientist and a male infectious diseases specialist - across four continents as they follow clues that lead them to the Russian mafia, al-Qaeda and the deadly secrets of The Antarctic Code.

## **The Antarctic Code**

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# THE ANTARCTIC CODE

Deo de Wit

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## Chapter 1

### Antarctica—October 2007

The *Aurora Australis* sailed from Hobart and headed due south on a relatively calm Southern Ocean, but after entering the furious fifties, the reputation of these latitudes was revealed. The barometer dropped, the ocean started to heave and six- to ten-meter waves crashed over the bow as the red, steel capsule ploughed southward. Inside the vessel there was little chance of rest or sleep as the flagging travelers were tossed around like ping-pong balls.

Ben was sick, clammy, and his pale skin contrasted starkly with his freckled face and thick red hair. The nausea was relentless, and with each bile-stained retch his head exploded and his whole body ached. He rolled around on his bunk clutching a bucket and anxiously watched the changing seascape through a porthole; one minute a wild, spray-filled ocean and the next a turbulent, foamy, murky green a meter below the surface.

The *Aurora* was bound for Casey station in the Australian sector of Antarctica, a nine day journey of 3500 km. Ben and three other world renowned influenza scientists had been invited to study a small epidemic, thought to be influenza, which was affecting the Adélie penguin population around Casey.

There was a knock on Ben's door.

"Come in," Ben groaned.

Mark Maloney appeared at the door. "Hell, Ben, you look like shit."

Ben didn't reply.

Mark, in his sixties, a short, rotund man with a ruddy face, was the Australian representative and leader of the Adélie team. "We're having a bit of a party tonight. Are you ready to join us? There's even some female company."

"Thanks for the invite, but I think I'll pass. If I find my sea legs by then, I'll definitely make an appearance."

"OK, maybe we'll see you. Maybe next time we come to Antarctica we'll take a plane."

“There’ll *never* be a next time!”  
Mark laughed and walked out.

By the following day the Southern Ocean was less turbulent but a steady three-meter swell remained. Ben felt marginally better and decided a walk on deck, away from the claustrophobia of his cabin, would be therapeutic.

He opened the door hatch and was immediately struck by the biting cold, the brisk southerly wind bringing the temperature to below freezing. He clutched the railing and spread his legs apart to brace himself against the rhythmic pitching of the ship. The sky was a brilliant clear blue and an occasional wave broke over the bow, scattering a fine, icy spray that stung like tiny bullets on his exposed skin.

The door opened behind him and he turned. A thin young man and a tall, olive-skinned girl of Asian appearance stumbled out and grabbed the rail next to him.

“Do you mind if we join you?” the man asked in a toffee English accent.

“No, sure, but it’s pretty cold out here.”

“Hugh... Hugh Thompson-Jones. Haven’t seen you before. I’m one of the physicists looking at global warming.” The Englishman stuck out his hand but withdrew it and grabbed the rail as the boat pitched again.

“Ben O’Reilly. Yeah, I’ve been holed up in my cabin. I’m with the Adélie group.”

“Tina Petersen. I’m with you.” Tina offered a beautiful wide smile to reveal a perfect set of white teeth. “Mark has told me so much about you. I believe you haven’t been well.” She spoke perfect English with a slight American accent.

Ben, mesmerized by her large brown eyes, could hardly manage a reply. “Yes... yes... that’s true, but it seems I’ve now got my sea legs, as they say. So you must be Mark’s PhD student?”

“That’s right. Mark brought me along to do the donkey work for the Adélie project. I hope it can be part of my dissertation.”

“Tina,” the physicist interjected. “I’ve got to meet the rest of my team. I’ll catch up with you later.”

“Sure, no problem.”

The Englishman disappeared through the door, and Ben looked at Tina. “So where did you do your basic training?”

“I completed my BSc and honors degree in Manila, and then Mark offered me a scholarship to come and do my PhD with him in Sydney. What about you? I’ve read a lot of your work; you certainly have published extensively.”

“It shows you how easy it is to fool some people.”

“You’re younger than I expected... I mean, to be a professor at San Francisco University and then to get an invite on this trip.”

“Yeah, at thirty, I suppose I got lucky, but then Mark’s a good friend and he convinced the Australian government to let me tag along.”

“Wow, look there!” Tina pointed to a large whale with an enormous flipper that breached the ocean about fifty meters away. “It’s a humpback. Look, there’s a whole pod, maybe about ten. No, twenty—! And... and look! Babies! Calves!”

Ben watched in amazement, but he was more taken by Tina’s animated, almost childlike excitement.

The humpbacks continued their aerobatic displays, raising more than half their body out of the water and coming down with a thunderous splash. Ben and Tina watched until the leviathans disappeared from sight.

“They’re probably coming back to Antarctica from their winter breeding grounds,” Tina said. “I believe it’s near the Great Barrier Reef.”

“You sound pretty well informed.” Ben was very content to listen to the beauty’s enthusiastic recital.

“Oh, not really. I just love them, don’t you? It’s a long journey and the calves often die of exhaustion or are attacked by sharks. The babies try to conserve energy by swimming in their mothers’ slipstream. Like this.” She moved in behind him, laughing, slipping her arms around his waist and then grabbing tight as the boat plunged again.

Although he would rather be nowhere else at this moment, Ben had started to feel a little queasy from the continual pitching of the deck. Before he embarrassed himself, he opted to make a dignified exit. “Tina, I’m sorry but I’ve got to go. I’m sure I’ll see you around.”

“Sure. You won’t be able to avoid me. Hey, weren’t those whales amazing?”

The deck lurched and Ben blanched.

“Are you alright, Ben?” Her brow furrowed above warm brown eyes and her hand rested lightly on his forearm.

He mumbled something but it caught in his throat and he fled down the hatch to safety.

Ben lay on his bunk with his hands behind his head. His nausea seemed to ease with thoughts of the captivating Tina. “Hell, she’s gorgeous, and smart too,” he whispered. He was smitten, even after such a brief encounter, which was unusual, as Ben had found very few female companions. Among San Francisco students, there was regular speculation about Ben’s sexuality. The almost reclusive professor squirreled away in his laboratory, only emerging for lectures and tutorials; the champion of all campus nerds and geeks. He was seldom sighted socially and seemed oblivious to the not to subtle advances from both male and female students.

By that evening Ben started to feel a little better and, after a shower, he dragged his lean six-foot frame up to the small dining hall where a few groups were huddled having pre-dinner drinks. With a twinge of disappointment Ben noticed that Tina was engaged in deep conversation with the English physicist.

Mark, who was standing with a middle-aged bearded man, called to him from across the room. “Ah, Ben, glad you could make it. You still look a little green around the gills.”

The Muslim was immaculately dressed in a white collarless tunic, buttoned up to his neck and covering baggy pants down to his mid-thigh. Over the tunic was a beautifully embroidered multicolored vest. He wore open sandals and a small round hat with a single central tassel that hung to one side. “Ben, I’d like you to meet Anwar Khan.

He's the professor of Microbiology at the Islamabad Institute of Medical Sciences and is the Pakistani member of our select little group."

Ben shook his hand. "I've seen your recent papers on the avian influenza outbreak in Asia. Some very good, cutting edge work. Congratulations."

Anwar held his hands together in front of his face and bowed slightly. "Thank you. Your comments are very generous."

"OK, it's time to eat. Why don't we sit down?" Mark ushered them to a small table.

Ben asked as he savored the rich Barossa cabernet. "Anwar, you did a lot of field trips in China with the bird flu. This trip must be just up your alley. You must be pretty excited."

"I agree that it would be a significant achievement to find an influenza virus in Antarctica, but the cold does not agree with me; I prefer the comforts of my own home." Khan had received his invitation while on the brink of a major scientific breakthrough.

Ben reveled in the intellectual and scientific dinner conversation, but found it difficult to remain focused as he was regularly distracted by Tina at another table.

Mark followed Ben's gaze, swallowed another mouthful of beef and laughed. "Stop drooling, young man. It looks like you missed your opportunity when you were in the bilge."

"Oh, yes, Tina. I met her this morning on deck." Ben took another sip of wine. "Mark, tell us a bit about the Antarctic research stations."

"Well, the Australian government operates three stations—Mawson, Davis, and Casey—and regularly invites Australian and foreign scientists to participate in scientific programs. The projects cover a broad range of scientific research, ranging from global warming to studies on microscopic life forms. The Adélie influenza epidemic, although small and not an imminent human threat, has been given high priority by the Australian government. Usually only about 1000 people inhabit the various stations during the winter, but the numbers swell to around 4000 in the Antarctic summer as scientists, like ourselves, arrive from all corners of the world."



“Is there enough comfortable accommodation for us?” Anwar asked anxiously.

“I’ve heard the accommodation is a little cramped and basic. Don’t expect anything flashy.”

The next morning, the first sighting of an iceberg brought most of the passengers on deck. It was a strange, almost magical scene, this large white chunk of ice projecting from the ocean. It looked out of place. The first bergs were small, or growlers, but as the ship continued south the bergs became a little larger. Still farther south they passed increasingly larger bergs, some measuring 75 meters in height and 200 meters in length. The travelers were in rapture as the *Aurora* came within fifty meters of a berg the size of an office block.

“It’s quite a humbling experience,” Mark marveled.

“That’s for sure, particularly when you consider that the bit below the water is seven times larger,” Tina added.

The bergs were of multiple shapes and sizes: large tabular ones, domes, pinnacles, wedges and big square blocks of ice.

As usual Tina provided the scientific explanation. “See the jagged, sharp edges and angular lines? That’s where the berg has fractured from the ice shelf. The smoother areas reflect the wear and tear of wind and sea.”

The early morning light struck the various angles and surfaces and created a virtual kaleidoscope of blue and white hues, and even a tinge of yellow as the sun reflected off it.

Ben stood with the rest of the Adélie group, transfixed in this mystical polar wonderland, watching the endless procession of blue and white shapes drift aimlessly past. They all turned as a large man with a grey beard clambered through the hatch, still wiping the sleep from his eyes.

Mark laughed. “Ah, Sergey, had a bit of a sleep in, I see. Was the Australian vodka a little too strong for you?”

“No. No. Not at all,” Sergey replied in a rasping cigarettes and vodka voice and made a sweep with his right arm. “But this is indeed a beautiful sight.”

“Ben, I’d like you to meet Sergey Solonik, the Russian member of our team.”

Sergey held out a large gnarled hand, gripping Ben’s like a vice. “How do you do? Mark speaks very highly of you.”

Much of Sergey’s research had been conducted during the Cold War period, and there had been skepticism about some of his unvalidated work. Since the fall of the wall he had not published as prolifically, either as a result of closer scrutiny or because funding was channeled in other directions. He was now fifty-five, and for Sergey this trip was an opportunity to re-establish his career and his reputation as a leader in the field of influenza.

“It’s a pleasure to meet you too. I’ve read a lot of you’re work.” Ben grimaced as Sergey released his hand.

“Well, Sergey, *we’ve* been out here for ages and we’re just about to go in and thaw out with some coffee. Why don’t you join us?”

“That sounds like an excellent idea.”

As they continued southward, the scattered bergs became ice floes, and subsequently, pack ice. Sightings of Adélie and Emperor penguins, as well as seals, initially caused excitement, but they soon became a common sight on the pack ice as the *Aurora* crashed on south and then west towards Casey.

One evening the Adélie group was invited to visit the bridge. They watched with fascination as powerful search lights illuminated the bow and the surrounding pack ice.

Pre-empting the usual question, the captain explained. “It is only a romantic notion that those searchlights help us find an easy way through the ice.” He pointed to the array of dials and computer screens. “As you can see, the bergs and submerged pack ice are clearly visible on those images, and plotting a course in this day and age is a relatively simple process. The lights are just there to tell us if we get it terribly wrong.”

Sergey was very impressed. “This boat is amazing! Look at the way it just eats up the ice!”

The *Aurora Australis* came within sight of Antarctica on the morning of the eighth day. Ben had read that Antarctica was a large continent, bigger than America, but he hadn't expected the height and grandeur of the mountains that dominated the vast whitewashed horizon. The ocean became calmer as they approached Casey, and when they sailed into Newcomb Bay they found a perfectly still anchorage. From the deck of the *Aurora*, Casey looked like a mining town, with buildings of various sizes scattered around a hill at the head of the bay. The scientists were ferried on barges to the Casey wharf, and from there to the station in Hagglands, large rubber-tracked vehicles. The Hags squeaked and rattled as the tracks crunched over the snow and black rock of the main street, bordered on each side by thick floes of ice and snow. Within the town were scattered large brightly colored sheds. The Hag stopped outside the Big Red Shed, Casey's main accommodation and recreation building. The Shed was already claustrophobically crowded, but The Global Warming team was squeezed into the last four of the 120 bunks. The four male Adélie scientists were placed in an outside donga, a converted shipping container with two double bunks. As one of the few female scientists, Tina was given the luxury of a small room next to the laboratory building.

The Adélie team was provided with some space in a very cramped and rudimentary laboratory, and in the days that followed, they set up their equipment in preparation for the first sampling. Tina did most of the work, and she worked tirelessly for two long days. Ben used numerous excuses to help, but soon got in the way and joined the others in the planning phase of the operation.

On the third day the scientists set out on snowmobiles to the Adélie penguin colony on Shirley Island, which is separated from the mainland by a thin strip of permanently frozen water. The sky was a clear blue, the hard-packed snow a brilliant white, and only a light wind blew down the slope of Law Dome, which rose slowly in the east to a height of 1400 meters.

Mark shouted to Ben over the noise of their snowmobile. "That's Law Dome, a massive ice sheet that's like a scale model of the

whole of the Antarctic ice cap. It's one of the main reasons Casey is here, so scientists can take ice cores and analyze them."

The trip was exhilarating, but cold; it was -10°C. They stopped on a small rocky promontory and below them, stretching 100 meters to the ocean, lay a noisy, raucous, busy and disorganized penguin colony.

"It may look a little hectic down there but it is in fact an extremely well organized community," Mark explained. "In the winter the Adélie live out on the pack ice and come home to this breeding ground every October. They gather a few stones for a nest and the female then lays two eggs."

"Always two?" Sergey asked.

"Yes, never less and very, very, very occasionally three," Mark replied. "The nests are at least two pecking distances apart. This stops a lot of the fighting but there is still a lot of stone stealing which causes a lot of squabbles."

"I believe the men share the nesting," Tina interjected.

"Yes. You will be pleased to know that the incubation of the eggs, which takes about thirty-five days, is shared equally between the male and the female. But don't worry, boys, they also share the work. The penguin not nesting goes out hunting; they mainly feed on Antarctic krill."

Interspersed among the penguins and around the periphery of the colony were a few dead penguins. Mark surveyed the colony and speculated, "As you can all see, it's not a massive epidemic... just one or two deaths every couple of days. If this is a strain of avian influenza, we may have expected a much higher attack rate."

"In this severe climate and extreme cold, I doubt the virus will behave as it does in warmer climates," Ben remarked.

"I agree with Ben," Sergey added. "Remember, we have never seen avian influenza in Antarctica. It would have to be a pretty resilient virus to survive this temperature, and if it did manage to survive, the cold would probably make it very hard for the virus to spread from one penguin to another."

Mark nodded and then took control of operations. "We should try to get specimens from a warm bird, one that's just died or one that looks pretty sick. This colony used to be freely accessible to all Casey

inhabitants, but because of the epidemic, it's now out of bounds. So let's put on our gear and walk through the colony and see what we can find."

The five scientists put on disposable masks, gowns, and gloves. Each carrying a disposable plastic bag, they headed off in different directions through and around the colony. As they got closer, the stench of the guano pervaded their nostrils; because of the melting snow, the colony was awash with penguin poo.

Ben chuckled. "What a mess. You wouldn't want to fall over here," he said to Tina, who was walking just in front of him.

They walked towards the ocean and noticed an agitated group of about twenty penguins pushing and shoving at the water's edge. One penguin was eventually pushed in, and then the whole group suddenly followed. Just after they entered the water, there was a mass of bubbles and turbulence, and a deep red stain appeared on the surface.

"What was all that about?" wondered Ben.

Tina explained. "I read that the leopard seal, who is the penguin's main predator, hangs around near the ice where the penguins jump in and out. When the penguins think there's leopard seal about, the odds of survival are much better when you're part of a crowd."

"So you make a sacrifice for the colony but you leave behind a partner and two babies," Ben pondered.

Tina stopped and knelt down beside a dead bird. "This one's frozen solid."

"So is this one," replied Ben, who had knelt down next to another bird a few meters away.

The search continued for another thirty minutes, by which time they had thoroughly covered the colony and found only dead, frozen birds.

Ben scanned the colony looking for sick birds but most looked healthy. The Adélie is the penguin stereotype, at about forty centimeters high and about five kilograms. They have a white tuxedo shirt front and a white ring around each eye; they are handsome but have a rather comical appearance. Ben noticed a large penguin slowly walking from the centre of the colony to the periphery. The bird looked neither smart nor handsome and was obviously not well; the waddling

gait slowed and the animal began to lurch from side to side. When it reached the edge of the colony, it collapsed on the snow.

“Tina, I think I’ve found one.” Ben walked quickly towards the bird and knelt down beside it. Tina soon joined him. “Look at all these secretions around the beak, and look at the rapid breathing. It looks like a respiratory infection to me.” The bird didn’t struggle when Ben picked it up. He took out a swab, sampled some of the secretions and carefully placed the bird in the plastic bag. “I think this bird will be dead soon. Let’s get it back to the lab. It’s probably worth taking a look at one of those frozen birds, too; you never know, the virus might survive -20°C.”

Tina picked up a dead bird, placed it in her bag and then pointed to the rocky outcrop. “Let’s go, the others are already back.”

As Ben and Tina headed back, a sudden cold gust of wind lifted their disposable gowns, and by the time they arrived at the outcrop, a strong steady wind was funneling down the slopes of Law Dome.

Mark and Sergey each held up their bags containing a penguin. “We only managed to find dead ones, but they still may have live virus,” Sergey replied confidently.

“Well, we did manage to find one live sick bird,” Ben added enthusiastically.

Mark had noticed that Anwar had not searched very far in the colony and attempted to engage him in the discussion. “What about you, Anwar?”

“It was so messy, noisy and cold down there, and with this wind I just wanted to get out. Are we going back now?”

Mark looked across at Ben and shrugged. “OK, let’s head back.”

As they got to the snowmobiles, Ben pointed to a large grey cloud descending the slopes of the Dome. “Hey, look at that. Whatever it is, it’s headed in our direction. We’d better get a move on.”

They were halfway to Casey when the blizzard struck. The freezing winds stung their faces and picked up the drift snow, creating blinding conditions. Visibility was reduced to about ten meters and the snowmobiles slowed to a crawl. They finally arrived, safe but relieved, and the small local blizzard abated after an hour.

By the time they reached the laboratory, the penguin had died. Tina, now gloved and gowned, placed the bird on its back, secured its legs and flippers and made a neat incision with a scalpel along the length of the tuxedo front. After further dissection the chest and abdominal contents were clearly visible. Instead of healthy, firm, unblemished red flesh, large grey soft patches were evident in the lungs, liver, spleen and kidneys.

“Wow! This infection is pretty widespread,” Tina exclaimed. She then cut into one large abdominal air sac, and frothy, turbid fluid oozed through the freshly cut opening.

All the scientists agreed that the widespread grey patches and congested air sacs were typical of a viral infection and felt confident that an influenza virus was responsible. Tina carefully cut pieces of tissue from the infected organs, ground them up in a small blender and inoculated them onto a variety of tissue culture media, which she then placed into a 37°C incubator.

Mark, Ben and Sergey each repeated the dissection on a frozen bird and found the same grey patches.

“If there is any virus in these samples, we should know in about forty-eight hours,” Mark said. “I think we should have a bit of a celebration tonight.”

The scientists and some of the technical support staff gathered in the Red Shed that evening and enjoyed a sumptuous meal and opened a few bottles of wine.

“So Tina, how did you get to know Mark?” asked Ben, who had managed to get a seat next to her.

“We met at a conference in Manila where I presented a paper on local strains of influenza. Mark was interested. He spoke to me after the meeting. We continued to correspond after that until he suggested that I apply for a scholarship in his laboratory.”

“I suppose opportunities like that don’t come round very often.”

“That’s for sure.”

“Do you have any relatives in the Philippines?” Ben asked, hoping to find out whether she was married or attached.

“Just my mother; my father died in an airplane accident when I was five.” Ben looked confused, so Tina clarified. “My father was an American pilot serving at the Philippine naval base; he died in a training exercise.”

“I’m really sorry to hear that.”

“Don’t be, my mother tells me that we didn’t see much of him. Most of those naval guys have their fun and then bugger off.” The acidity in her tone was obvious. “Anyway, the American government gave my mother a pension that enabled me to go to university and put food on our table, so every cloud has a silver lining.” She laughed as she tossed her long black hair.

At that point Mark called for everyone’s attention. “I want to thank all of you for all the planning and work that has gone into this operation. I think we may be on the verge of something big in the influenza field. I’m going to bed, but the rest of you please stay and enjoy yourselves.”

The remainder of the group got up from the table but continued to mingle and drink. To Ben’s dismay, Tina ended up in a deep conversation with Sergey for the next hour. Ben attempted to discuss the current situation in Pakistan with Anwar, but as soon as the conversation turned to the war in Afghanistan, the discussion became a little tense and was terminated.

Ben stood with an empty drink in his hand and was contemplating turning in when he felt a movement at his side.

“I’m not married if that’s what you wanted to know,” Tina said with a cheeky smile.

Ben blushed. “No, no—”

“Don’t worry, it’s OK. I’m twenty-six already, which by Philipino standards is too old to be single. My mother keeps asking me, ‘Aren’t there any nice men at the university?’” She smiled. “And what about you?”

Ben was taken aback; in California this line of conversation usually only led one way. He couldn’t believe his luck, but he managed to stem the rising hope. “I’ve been much too busy with work to even think about girlfriends, let alone marriage.”



“Well, I’ll see you in the morning.” And with that, Tina turned and walked out.

Ben was left standing alone in the middle of the room. His brief moment of promise had evaporated.

The initial euphoria over the sampling turned to dismay when the cultures failed to yield any virus. They went back to Shirley Island several more times and studied the colony more carefully, noting that sick birds always walked from the middle to the edge of the colony to die.

“Probably a form of innate behavior that serves to protect the colony,” Ben theorized.

After another week of further sampling and cultures, there was still no evidence of virus, and dismay turned to despair.

During one of their regular brainstorming sessions, Ben suggested they go back to basics and inoculate the samples directly into chicken eggs.

“That’s pretty outdated technology,” Sergey exclaimed.

“I agree with Ben,” Mark said. “There’s got to be virus there; we just don’t seem to be able to grow it. We’ve tried everything else. What have we got to lose?”

Anwar, who had not contributed much up to that point, interjected. “I think this virus is so adapted to this frozen climate that it won’t grow in any of our media, even chicken eggs. We should just accept our failure and pack up.”

Mark, who was becoming a little irritated with Anwar’s pessimism and lack of involvement, made the decision. “Failure here is not an option; we’re supposed to be the best in the world. As the leader of this little group, I say we try the chicken eggs, and if that fails we could even try to make up some cell cultures from some live penguin kidneys. The virus should be able to grow in the very cells in which it is causing an infection. We will stay here for another two months if we have to.”

Three days later Tina burst into the tea room. “There’s a virus growing on the chicken eggs!”

They rose as one and ran the few meters to the laboratory. On the bench was an egg with part of the shell removed. A light illuminated the egg and a large magnifying glass was placed over the hole.

Mark got there first. “Mmmhmm. Bloody hell, if that isn’t influenza, I’m a—”

They all took turns and enthusiastically agreed that they had isolated the first influenza virus in Antarctica.

The laboratory was not geared for a full molecular workup so only basic viral studies were possible. The virus from the egg was reinoculated into other eggs, and they repeated the process five times, a procedure called passaging. Thereafter the virus grew readily in tissue culture, which allowed for easier laboratory manipulation and transport. Over the next two weeks the team worked tirelessly to complete the basic characterization of the virus. When that was complete, Mark called the group together.

“We’ve done as much as we can at the station. Each of you will get a sample of the virus to take back to your respective laboratories. The proviso is that if you work on the virus, you must collaborate with the rest of the group. If you find something, you must tell the others.”

“When are we going home?” Anwar asked.

“The boat leaves this Sunday morning. Tina will aliquot the virus and give you each a sample when we disembark in Hobart.”

Once a month during the summer, each scientific group gets an opportunity to present their work and findings to the other scientists at the station. The evenings are the highlight of the Casey social calendar and are eagerly attended by all scientific and technical support staff. It was agreed that Tina would present the Adélie work on the Saturday night before the *Aurora*’s departure.

The first presentation of the evening was by the young English physicist who gave an absorbing dissertation about the effects of climate change on Antarctica. He demonstrated clear evidence of the melting Antarctic ice-cap and showed graphic images of the calving of

the ice shelf near Casey. The talk generated some heated debate and was followed by the main course.

Dinner was followed by a Swedish group that had studied human interactions and compatibility during the isolation of the recently completed nine-month winter. During the subsequent audience discussion two winterovers openly described the mental, social and sexual problems that they had experienced during the long winter.

Ben had again managed to get a seat next to Tina. "I suppose this work will give you your PhD."

"Yes, I think so. Mark said if we found a virus, I could use the discovery and some of the basic characterization for my dissertation."

"What then?" Ben probed.

"Well, it will probably still take another two years to do the work and do the writing, but after that I really hope to go home. I'd like to get a research and teaching position in Manila."

Ben had consumed a few too many glasses of red wine, which gave him the required persistent courage. "We have a world class research unit at San Francisco. I'm sure I could organize a post doc placement if you were interested."

"Are you sure it's my research abilities that you're interested in?" She laughed and Ben blushed.

Ben was saved from further embarrassment by Mark's announcement from the podium. "As some of you know, our group has been working on the epidemic that has been affecting the Adélie penguin colony near this station. Our PhD student, Tina Petersen, will present our findings." There was some polite handclapping as Tina walked up to the lectern and the lights were dimmed.

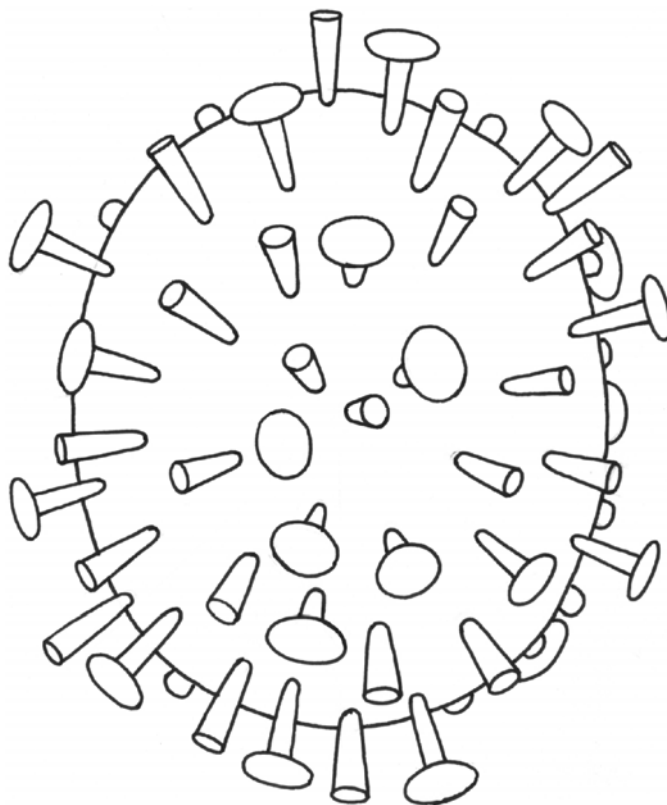
"Thank you for your attention. As there are scientists here from many different fields, I will try to explain our findings in everyday terminology. Please don't be offended if you find it too simplistic."

Tina started by describing the outbreak in the Adélie penguins, the sampling of the birds, and the methods used in the laboratory. Tina had prepared well and Ben was impressed by the detail of her Power Point presentation; there were beautiful clear images of the penguin colony, the sampling and dissection process, and even microscopic images of the cell cultures damaged by the virus. He was even more

impressed with Tina the woman, the glow from the lectern light accentuating her flawless skin and exotic beauty.

“We finally managed to isolate an influenza virus from lungs, spleen, liver and respiratory secretions from both frozen and recently deceased birds.” She stopped for a moment and sipped from a glass of water. “Before continuing I would like to give you a little background about influenza virus. Influenza is found in a wide variety of animal species such as humans, all varieties of birds, swine, horses, dogs and whales. There are many strains of influenza; some cause disease in only one animal species while others can cause disease in numerous species. Birds carry the largest number of influenza strains.”

The next slide of her PowerPoint presentation revealed a globular egg-shaped structure with multiple projections.



“This is a schematic drawing of an influenza virus. Note that on the surface are two types of projections. The straight rod-like structures are called Haemagglutinin and are the structures by which the virus attaches to the cells in the mouth, pharynx and lungs to start an infection. The mushroom-looking structures are called Neuraminidase and are important for viral spread from cell to cell, and for escape from the infected cells. Different influenza viruses carry different Haemagglutinin, or H, and Neuraminidase, or N. We can therefore use the H and N to classify influenza viruses. Here are a few examples of influenza virus classification according to H and N.” The next slide appeared and Tina spoke to it.

“H3N2: The most common cause of human influenza. H3N8: The cause of equine influenza. H1N1: The cause of the 1918 Spanish flu which killed between 20 and 40 million people. H5NI: The cause of the current Asian bird flu outbreak.”

“The virus isolated from the Adélie penguin has been given the official name, A/Casey/2007(H3N2), which means it is an Influenza A virus, isolated at Casey station in 2007, and is the H3N2 type.”

There was loud applause for the recognition given to Casey.

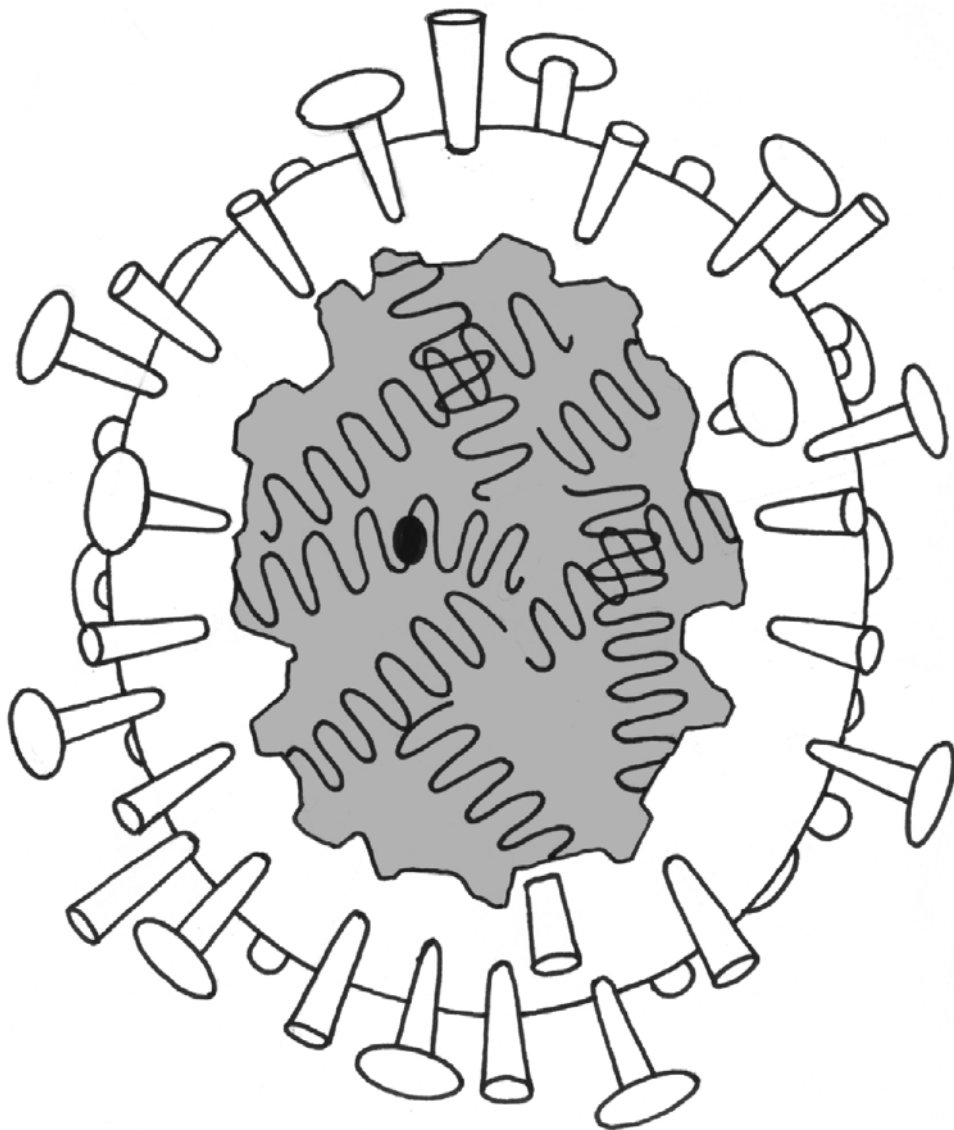
“Influenza has never been isolated from birds or animals in Antarctica, which makes this an unusual discovery. The virus is a common human strain of influenza, and was probably transmitted from humans to birds because of the frequency of contact and close proximity that humans have with the colony on Shirley Island.”

A concerted rumbling and shaking of heads spread through the audience. The closeness of humans to the Adélie colony was a much debated and contentious issue at Casey.

“This virus has some characteristics that make it very different to the human strain from which it was derived. For example, it is able to survive in extreme conditions: it can survive in the laboratory from -20°C to 50°C and also can withstand extreme drying. The virus obviously has some unique survival characteristics that have allowed it to survive in the Adélie penguin in the coldest and harshest place on earth.”

Tina paused for a moment, took another sip of water, pushed the Forward button, and her next image of the egg-shaped structure with

projections appeared, but this time the shell was cut away to reveal eight black coiled springs.



“The remaining question is why does this virus have these characteristics? Humans carry all their genetic information within DNA

on thirty-two chromosomes. Influenza A viruses carry their genetic information on RNA on eight chromosome-like structures, which are depicted here as the springs.”

She paused again and pointed to a dot on one of the eight pieces of RNA. “The genetic material that codes for the unique survival characteristics of the Adélie virus must be somewhere on the viral RNA, depicted here as this dot. We will call this unknown piece of RNA the Antarctic Code. Over the next six months to one year, scientists from Australia, America, Russia, Pakistan and, of course, the Philippines will attempt to unravel the Antarctic Code.”

Tina paused again. “Thank you.”

There was loud applause from the entire audience. Tina was beaming from ear to ear. She had given a very simple but eloquent presentation of a very important discovery.

“Well done,” Ben whispered as she sat down next to him.

After Tina’s presentation the audience started to get up and move around, huddling in small groups, discussing the evening’s presentations and other scientific events occurring in Antarctica. There was plenty of good Australian wine and the subdued, sensible and informed discussion soon evolved into a louder jovial hubbub and a more festive atmosphere. Tina was obviously the talk of the town and a large group of scientists had gathered around her. Ben, who was in discussion with one of the Swedish scientists, glanced across at Tina’s group and noticed the English physicist in the inner circle. He sighed, shrugged and resigned himself to his discussion with the Swede.

Bob, a long-term Antarctic resident, had taken control of the lectern and microphone. “Ladies and gentleman, could I please have your attention? Many of you are leaving tomorrow so we are going to share with you a very special little Antarctic cocktail. We call them Poppys: Glenfiddich chilled with natural Antarctic ice. Enjoy.”

Ben took a glass of Glenfiddich and the waiter dropped in the ice. Hundreds of thousands of years of pressurized gas escaped in a massive froth of bubbles accompanied by loud popping and cracking. Ben took a sip. “Doesn’t taste bad either.”

By about midnight Ben had finished a few Poppys and some wine, and was about to walk across to his quarters when Tina sidled up to him, smiling, tipsy, and obviously happy with the night's proceedings.

"Hi, stranger," she announced. "How about talking to this very promising young scientist for a while?"

Ben was on his guard. "What happened to your English boyfriend?"

"Oh, I see." Tina giggled. "I hope that's jealousy." She stepped closer so they were just touching.

"No, he just looked like your type."

"And how would you know what my type is? For the record, I like my men tall, very smart, and I'm partial to red hair." She giggled again and let out a cheeky laugh.

Ben blushed. She was too confident for him. He felt awkward, so he diverted the conversation. "Would you like a cup of coffee?"

"That sounds good. But I'll take you to the best coffee house in town. The stuff they serve here is a bit rough."

Ben wasn't sure where she was going, but they put on their jackets and walked out into the freezing night air.

Tina confidently put her arm around Ben's waist and placed his arm over her shoulder. "It's -15°C out here. We should at least try to keep each other warm."

Ben grunted. He didn't know what to do.

Tina led them about seventy meters to a building near the laboratory. She put a key in the door and walked in. "Voila! My digs. I make the best coffee in town."

She boiled a small kettle full of water and poured it into her coffee plunger while Ben fidgeted in the middle of the small room. Tina, recognizing his discomfort, stepped closer. "Ben, I think we should forget about the coffee." She put both her arms around his waist and rested her head on his chest.

Tina's sensuous closeness and the alluring scent of her hair enabled Ben to overcome his clumsiness. He pulled back slightly, lifted her chin gently with one hand, and kissed her. The kiss was everything he had imagined—soft, wet, eager—and all Ben's inhibitions



evaporated as he felt the tingling down his spine and the surge of emotion in his groin.

Tina slowly pulled away. "Why don't you stay over?"

Ben looked across at the small double bunk against the wall. "OK, but only if I can be on top."

Tina laughed, a throaty, naughty laugh. "Well, it seems that you have come out of your shell a bit." She nodded at the lump in his trousers.

They kissed again, long, hard and passionate, slowly exploring each other through the multiple layers of Antarctic clothing.

Tina gently broke the kiss and turned off the main light, leaving only a small side light near the full coffee plunger. She held Ben's hand and guided him to a chair. "Boots first." Removing the waterproof ankle-high boots, which were difficult to remove under normal circumstances, became a clumsy, frenetic process in their excited eagerness. "Now for all these clothes?" She paused for a moment and giggled cheekily. "I know, how about our own private little show? Just follow me." Tina danced around in a small circle, swaying her hips, and slowly removed her jacket, followed by a woolen sweater. Teasingly she undid each button of her cotton shirt, twirled it around her head and threw it across the room. Finally she slid out of her jeans and did a little pirouette in her full-length thermal underwear.

Ben, entranced by her routine, hastily and clumsily followed suit and stood with her, unable to hide his desire in the stretchy thermals. He reached for her again and, feeling the unrestrained, soft contours of her body, kissed her more passionately, more eagerly.

Tina felt his hunger and pressed her pelvis firmly against his. Breathing deeply, she moved back and slowly, seductively started to take off her thermals. Ben followed, watching, savoring, anticipating every movement. Her brown naked flawless skin glowed in the dim light, her breasts firm and round, her buttocks and thighs taut and muscular.

"Let's just stand here for awhile," Tina whispered huskily, then nodded to the bunkbeds. "There's not going to be much room in there."

It was warm in the room. They held each other tight, kissing and slowly exploring each other's most secret and intimate parts, delaying for as long as possible the climb into the small cot.

Tina climbed in first and just managed to fit.

Ben squeezed in next to her, his feet hanging over the end and the top bunk only a foot from his nose.

Tina giggled, but she stopped abruptly as Ben rolled gently over her and, in their restricted confines, managed to unite them in a slow and exquisite search for each other's needs and desires. Finally, amid rapid, expectant breathing and uninhibited moans, they erupted in a mingling of ecstasy, satisfaction and joy.

An hour later Ben still lay awake, bewitched by Tina's body moving rhythmically in her sleep. He was no longer infatuated; he was convinced that he had fallen deeply in love. He carefully untangled himself, got up, kissed her on the cheek, and quietly got dressed.

The cold Antarctic night took his breath away as he stood fastening up his jacket outside Tina's doorway. A light was on in the laboratory, and a silhouette was moving around inside. A few seconds later the light went out and a large hooded figure appeared in the doorway, looked from side to side, and then walked quickly in the direction of the Red Shed.

*A bit late to be working in the lab,* Ben thought. *Maybe he wants some company on the walk back.* "Hey," Ben called out softly.

The figure turned towards Ben, his face hidden by the shadow of his hood, paused for a moment, then walked quickly ahead.

*OK... obviously not keen for some late night conversation.* Ben's boots crunched on the hard packed snow and he thought wistfully of his night with Tina as he walked at a slow pace towards his own quarters.

About thirty meters ahead of Ben the figure disappeared behind some buildings just before the Red Shed. A light hanging from the front of the shed illuminated the road and the surrounding snow.

Ben reached the Red Shed, which was now quiet, and was about to turn off to his donga. There was a blinding pain on the back of his head, a white flash and then blackness.

As he opened his eyes, Ben lay face down in the snow. His nose was cold, his mouth was full of snow, and he had an excruciating headache. A metal bar lay one meter away. He searched his head for the source of the pain and found a tender, open, sticky bulge underneath his matted hair. *Shit, what happened? Who was that big guy? Why did he hit me? How long have I been lying here?* He looked at his watch and calculated it hadn't been more than five or ten minutes. He got up gingerly and made his way to his donga. He quietly entered, noticed the three other occupants were fast asleep and slipped quietly into bed.

The following morning was hectic. The boat was leaving at 10 a.m. and everyone had slept in and woke with throbbing hangovers; the Poppys were renowned for this. There was a flurry of activity to gather their personal belongings and scramble onto the boat. The *Aurora* finally set sail an hour late.

Ben stood on deck and watched Antarctica disappear into the distance. He had only caught glimpses of Tina during the chaotic departure. He looked around, hoping to talk to her. He finally found her looking through her laboratory notes in the small library. "Don't you ever stop working?"

Tina looked up at him; she seemed a little flustered. "The freezer space for our group was in a real mess this morning and I couldn't find the aliquots of the Antarctic virus that I had put aside for each of you. I can only assume that someone else rummaged through our stuff by mistake in the rush to leave."

Ben immediately became anxious at the loss of the precious virus. "So does that mean we don't have any virus?"

"Fortunately I kept some in the small freezer in my room as a back up in case the lab freezer packed up. I spent the morning thawing it out and re-aliquoting."

Ben breathed a sigh of relief. "Glad to see someone has their mind on the job. My mind has been a little preoccupied." He offered a mischievous smile.

Tina didn't respond to Ben's playful reference to the previous night and buried her nose in her book. An awkward silence followed,

which Tina finally broke. “Where did you get to last night? I was hoping we could wake up together.”

Ben was surprised. “I... I left because I was trying to protect your reputation. I didn’t think you wanted the whole world to know your business.”

Tina stood up. “I don’t have that type of reputation. I never have casual sex. I went to bed with you because I like you a lot and hoped that we could get to know each other a little better. I haven’t been this happy for a long time and I don’t care if the whole world knows you’re my man.”

Ben felt a little stupid. He moved towards her, put her arms around his waist, gently pulled her towards him and kissed her. She held her arms around his neck and Ben winced as she stroked his hair. “Gee, that’s a bit of a lump. What happened?”

“It must’ve been the top bunk; I didn’t feel it at the time.”

Tina laughed her cheeky laugh and snuggled up tight in Ben’s arms.

The next ten days were the happiest days of Ben’s life. He and Tina were inseparable. The *Aurora* sailed under a sunny sky, a full moon, a cold southerly wind and, to Ben’s relief, a calm Southern Ocean.

Scientists discover an unusual influenza virus in an Adélie penguin colony in Antarctica and attempt to unravel the genetic code responsible for its unusual properties. The story then tracks the lives and interpersonal relationships of three Californian siblings - a female detective, a male research scientist and a male infectious diseases specialist - across four continents as they follow clues that lead them to the Russian mafia, al-Qaeda and the deadly secrets of The Antarctic Code.

## **The Antarctic Code**

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