

**THE
SEED
GATHERERS**

The Seed Gatherers

INGE MELDGAARD

A Novel

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editing this manuscript.

Maintaining genetic diversity, or biodiversity, is
one of the most fundamentally important
concepts relating to life on Earth. It is both the
cornerstone and the culmination of evolution.

DEDICATION

This book is dedicated to the memory of Nikolai Vavilov and to the staff of the historic Pavlovsk Research Station in Saint Petersburg, Russia. Established by Vavilov, a botanist, in 1926, this research station was the first seed bank of its kind in the world. It is one of a number created across the former Soviet Union to house a vast collection of seeds and tubers from both wild and cultivated crops, collected over decades, and from many different countries.

The collection at the Pavlovsk Research Station is also a botanical garden of trees and plants, spread over some twelve hundred acres. This collection is harvested to replace ageing stock, while seedlings and cuttings are sent to other parts of the world. There are, for example, around six hundred varieties of apple, collected from thirty-five different countries.

Vavilov and his staff had the foresight to realise these old food crop varieties and wild plants had both the potential to enhance our diets and to save us from starvation should existing crops fail...and fail they do. Industrialisation of agriculture has reduced the number of crops grown worldwide to a very low number, often requiring the use of expensive pesticides and fertilisers to maintain their health. As the climate and geography of the world changes, crops that were once viable may no longer be so, either due to changes in the weather, increased vulnerability to pests and diseases, or simply because in some regions suitable agricultural land is no longer available. Climate change is also forecast to decrease the protein content and increase the natural toxins in many crop varieties due to higher carbon dioxide levels in the atmosphere.

While genetic engineering may solve some problems, reintroduction of, or cross-breeding with, older varieties of food plants is frequently a far more productive, less expensive, more reliable, less dangerous and faster method of obtaining results. However, since the collapse of the Soviet Union in 1991 the Pavlovsk Research Station has been critically short of funds and so struggles to maintain its vital work.

The history of this priceless seed bank is both tragic and ironic. Vavilov was imprisoned by Stalin and subsequently died of starvation in 1943. Also during World War II, when Saint Petersburg, or Leningrad as it was then named, was under siege¹, twelve of the scientists working at

¹ The Siege of Leningrad by the German army and their Finnish allies began on the 8th September 1941 and was lifted on the 27th January 1944. Hitler's expressed aim was to utterly destroy the city. This battle alone cost millions of lives, civilian and military, in both the city and throughout the region, from starvation and the direct effects of war.

the research station chose to die of starvation rather than eat the seeds and tubers in their collection.

The future of the station was again under threat in 2010 when the Russian Government decided to use twenty percent of the research station's fields for a housing development. An international campaign succeeded in temporarily preventing this from going ahead, gaining the attention of Prime Minister Medvedev, who undertook to look into the matter.

The Royal Botanic Gardens (RBG) at Kew, in England, now also house a vast collection of seeds and are part of the Millennium Seed Bank Partnership, which comprises organisations across some fifty countries. The RBG targets plants and regions most at risk from climate change and the ever-increasing impact of human activities. In 2012, ten percent of the world's wild plant species were represented in their seed bank. Another important organisation within the international network of biodiversity conservationists is the Global Crop Diversity Trust. The Trust is actively involved with the Government of Norway in the operation of the Svalbard Global Seed Vault, a 'fail-safe' facility established by the Norwegian Government and opened in 2008. This facility provides a safety backup for existing gene bank collections.

In Melbourne, Victoria, the Royal Botanic Gardens, established in 1846, play a vital role in the conservation of plants, through biodiversity research, programs to protect rare and threatened plants, and the study of habitats. The organisation encompasses two large sites in Melbourne and includes the National Herbarium of Victoria, the State Botanical Collection and the Australian Research Centre for Urban Ecology. The National Herbarium of Victoria was established in 1853, and houses a collection of approximately 1.2 million dried plant, algae and fungi specimens. The majority of the collection is Australian, with an emphasis on the flora of Victoria. The Herbarium is responsible for the Victorian Conservation Seedbank, which is part of the Millennium Seed Bank Partnership (MSBP). The seed bank collects seeds from native species within Victoria for long-term storage, research and restoration programs. Over the first five years of the project (2005–2010) seed collections from over 500 Victorian plant species were incorporated into the Victorian Conservation Seedbank, and duplicated within the MSBP. Of the approximately 3,200 native species in Victoria, nearly 800 are considered to be in danger of becoming extinct within the next few decades. Developing techniques for seed germination and seedling growth are critical if plants are to be returned to the wild, and work related to this issue is routinely undertaken for all species collected. ²

² Reference: www.rbg.vic.gov.au

CHAPTER ONE

The flooded streetscape of the central city and the brown waters of the Yarra River, snaking its way toward Port Phillip Bay, greeted Yngwie as he peered out the window of the interstate airjet circling high over Melbourne's Tullamarine airport. The bright, early autumn sky had turned the glass of the landmark Rialto tower into a gleaming finger of blue light, soaring upwards in a gesture that to him seemed appropriate, considering what he had come here to do. Yngwie chuckled, then stretched and yawned. The trip from Western Australia had taken most of the day, travelling from the north of the state, where, amongst other things, he had taken a tourist flight over the Bungle Bungle range, located in the vast Purnululu reserve. At this time of year, during the wet season, the heat and humidity were in stark contrast to Norway, still in the grip of the same icy sub-zero temperatures of two months ago, when he left his home town of Rjukan.

Yngwie was not due back until mid-June, ready to begin university in Oslo in July, where he intended to study information technology. Eventually, he wanted to specialise in the challenging new field of large-scale holographics. Meanwhile, there were still three months left to enjoy, so he hoped Melbourne would prove more interesting than he anticipated. There was one place, though, he wanted to see, and this was the old forest on the northeastern boundary of the city. The forests here were altogether different from those of Europe and elsewhere, and were home to a remarkable variety of unique creatures and colourful birds.

His thoughts were interrupted by the voice of the airjet's captain announcing that they had landed and passengers were now free to disembark. Although nowhere near as hot as Western Australia, the heat outside still held Yngwie in its fierce grip as he walked the short distance from the main airport building to the waiting railcar that would take him to Ferntree Gully, located on the outer edge of Melbourne, at the foot of the Dandenong Ranges. He entered his Federation identity number into the transport's terminal, together with his destination, then found a seat and watched while the other passengers from the latest flights settled into theirs. A little over an hour later, Yngwie was standing outside the communal house, in the centre of Ferntree Gully, where he had booked a room.

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The entrance to the communal house consisted of a plastiglass-enclosed foyer, surrounded on the outside by what appeared to be a large vegetable garden and a small fruit orchard. Dusk was falling and Yngwie was more than ready for his evening meal, so instead of exploring the area as he might otherwise have done, he approached the foyer door and asked to speak to the manager. When the door slid aside, he didn't have long to wait before a young woman entered the room, smiled, and introduced herself. As they shook hands, Yngwie said, 'I have a booking for two weeks, which I confirmed yesterday... Oh, and by the way, is the *entire* living area beneath the ground?'

'Yes, it is,' replied the young woman, her eyes crinkling in amusement. 'Most of the buildings outside the older central areas are underground. They have been for a long time... More energy-efficient, and safer too. It also frees up the land. Did you notice our garden outside?'

'I did. It's a unique approach, and gives an air of mystery.' Yngwie grinned. 'I like it, and I like the gardens I saw on the way here from the airport.'

'Well, there should be plenty for you to enjoy then, especially our forests. Do you intend to do any walking?'

'Oh yes. The big trees...the mountain ash...are one of the main reasons I came here. I understand there aren't many left?'

'No, sadly, but we look after the ones we still have. Now, we need to complete your booking, so if you could just place your right hand on the identification pad of the computer here... Thank you... And we also have an old-fashioned custom of asking our guests to sign and date our guest book. Do you mind?'

'Not at all.' Yngwie signed his name with a flourish then wrote the date: Saturday, the third of March 2457.

After the evening meal, rather than socialising with the other guests, Yngwie returned to his room. He took his hand reader from his backpack, checked the time, had a shower, then got into bed and set the alarm to wake him at 04:30. Five years of painstaking research, testing and probing had gone into the software he and his friend Torleif had built, and tonight, they would see the results of their work. For their plan to succeed, they each needed to be precisely where they were now: Torleif was still in Rjukan, Norway, and Yngwie was here in Ferntree Gully, Melbourne. At 04:56 Melbourne time, the software would be activated, and two minutes later, when the sun set in Rjukan at 18:58, local time, Torleif would see whether the first step in their plan had succeeded. If not, he would contact Yngwie, and if Yngwie heard nothing, he would find out for himself what happened next, when the sun set tomorrow,

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here in Melbourne, at 19:53. The final step, when the cascade was programmed to begin worldwide, would occur at 21:46 Melbourne time, which was when the sun went down in Perth, at 19:46, their time. Yngwie smiled; he was sure of their success. Afterwards, well...that was another matter.

The next morning, in nearby Berwick, Shahid rose from his bed, laid out the mat his mother had so lovingly embroidered, then knelt to pray. When he had finished, and after carefully rolling up the mat and putting it away, the young man made his preparations for the day, with his usual calm, precise movements and attention to detail.

Today, his morning would be spent travelling from his home to the forests of Sherbrooke, in the Dandenong Ranges, thirty-five kilometres from the centre of Melbourne. Once there, he intended to make his way up the hillsides on foot until he found the mature mountain ash for which he was responsible. Due to environmental degradation and changes in climate, *Eucalyptus regnans* was now a rare and increasingly endangered species in the State of Victoria, so the regions where it grew were divided into segments, each with its own seed gatherers and team of forest guardians. As a seed gatherer, Shahid's work contributed to the survival of the species and to the rehabilitation of areas where the trees could be reintroduced.

Outside, the day was already too warm and, despite the air-conditioned comfort of his landjet, Shahid looked forward to the cooler temperatures within the forest. He had brought food for his midsun meal plus an ample supply of water because once he reached his destination, there would be nowhere convenient to obtain any. All private dwellings had long since disappeared from the Dandenong Ranges, and the closest township, Ferntree Gully, was located on the plains of the western side, with Gembrook twenty kilometres away on the eastern plain.

When he arrived at the base of the mountain, Shahid secured his landjet and put on his backpack. The dry forest of mixed trees – messmate, narrow-leaved peppermint, mountain grey gum and blackwood – grew far up onto the hillsides, replacing the mountain ash that once lived there. As he walked, Shahid listened to the birds calling to each other, some loud and raucous, others melodic and sweet to his ears. He recognised the song of a grey butcherbird, which was followed by the screech of a white cockatoo, and then the keening cry of a currawong. The sound he longed to hear was missing: the call of the lyrebird. Common in this area before white settlement, they became increasingly rare as the forests were cut down and introduced animals preyed upon them. Now, they were all gone, their glorious dance a distant memory.

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After walking for some time, Shahid located the tree he was seeking: a three-hundred-and-fifty-year-old mountain ash, some ninety metres in height. Straight and tall, with white bark and brown peeling layers, it was, to him, a wonderful sight. The old tree was in flower and the coming season promised to be bountiful. Scientists from the Willsmere Research Centre in Kew, here in Melbourne, had almost finished their aerial survey of the mountain to establish how many of the eucalypts were in flower, and the results so far were encouraging. For the past three years, very few had flowered sufficiently for a good harvest. With luck, however, this year, he would collect the seeds in mid-winter and send some to both the Global Seed Vault in Svalbard, Norway, and to the Federation Herbarium in Oslo. It was time to replenish their stock.

Shahid inspected the tree closely to make sure it still appeared to be in good health, then continued on towards the next mountain ash listed on the survey map. The dry forest floor crackled underfoot and small insects scurried away as he walked. The danger of fire was ever-present, and too frequent bushfires in the past were one of the reasons the mountain ash were now rare, but today the risk was low, there being only a light breeze. Nevertheless, should the worst happen, he had memorised the locations of the well-provisioned underground fire bunkers liberally dotted throughout the hills.

One of these bunkers provided a cool and restful place for Shahid to first pray and then eat his somewhat elaborate midsun meal, prepared by his mother that morning. Although he was twenty-eight years of age, he saw no reason to live elsewhere than with his parents, particularly as he thoroughly enjoyed their company. His father worked as a medical practitioner at the Ferntree Gully medcentre, while his mother was a psychologist with the Melbourne Peacekeeping Force. Both were proud of their son's work and glad he had chosen to remain at home until, perhaps, the day came when he found a bondmate, although this was not something they discussed.

The early afternoon passed pleasantly, despite the breeze having become stronger, ruffling Shahid's soft, black hair. He wore it shoulder length, which suited his oval face, with its large, expressive brown eyes. Of a slight build, he was nevertheless extremely fit, and strong enough to easily climb to the tops of the mountain ash to collect their seeds. Perched in the treetops, Shahid felt even closer to his spiritual centre, as well as to the forest he helped protect. Today, though, was a day of remaining close to the ground, looking for signs of ill health in the understory plants and the soil surrounding the trees. Noticing a young blackberry seedling – a noxious and rampant weed if left to grow – he knelt to remove it, and then collapsed to the ground, writhing in agony. His leg felt as if it had been stabbed to the bone and he had only enough

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time to pull his comlink from his pocket, desperately hoping to activate its emergency signal, when he lost consciousness.

With a wet scarf wrapped around his nose and mouth, Yngwie watched the flames for as long as he dared. The reality was far more frightening than he had ever imagined, the noise and smoke almost overwhelming. Turning aside at last, he moved away from the fire and walked as quickly as he could safely manage in the direction of Ferntree Gully. Running was out of the question – the terrain was far too dangerous and stumbling could cost him his life. With still almost two and a half kilometres to go before he reached the edge of the forest, Yngwie noticed someone lying motionless on the ground, near the base of a small eucalypt. He cautiously approached then knelt down to feel for a pulse. Although weak, it was there. As he reached for his comlink to call the nearest medcentre, he noticed, about one and a half metres away, a large, dark spider, hiding in the leaf litter. He instinctively flinched, but the startled spider soon scuttled away. Relieved, although still wary in case there were others nearby, Yngwie spoke with the medtech who answered his call.

‘A large, dark spider, you say,’ said the medtech, eyebrows raised. ‘Were its legs thin, or thick-looking?’

‘Definitely thick,’ answered Yngwie, ‘and it was one of those fat, ugly things everyone thinks of when they talk about scary spiders.’

‘Hmm... We’re not aware of any large, venomous spiders in this part of Victoria, but we’ll send some anti-venom with the ambutechs anyway. They should be there in about twenty minutes at the most. Keep him still in case he wakes up, and don’t move him.’

‘What if the fire comes closer? The smoke is getting worse.’

‘If all else fails, you’ll have to carry him out, but in the process, if he *has* been bitten by the spider, he might die. You need to be prepared for the possibility.’

‘Damnation!’ muttered Yngwie. ‘Well, I hope the ambutechs get here quickly. Can you stay with me while we wait, in case something happens and I don’t know what to do?’

‘Yes, no problem... Where are you from, if you don’t mind my asking? Your accent is a little unusual.’ The medtech smiled in an effort to reduce the tension.

‘I’m from Norway...on holiday. I want to stay for at least a few weeks. This is a fascinating country, but harsh.’

‘Yes, it can be, but yours can be unkind as well, can’t it?’

‘Oh yes... The winters are long and it’s easy enough to die, but we’re used to it, so manage fairly well.’

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‘How are you finding the heat?’ The medtech had noticed Yngwie was beginning to perspire.

‘The heat is fine. Our summers can be just as hot, though not for long.’ Yngwie wiped his face with the scarf he had taken off to make his call to the medcentre. He was beginning to feel ill from breathing in so much smoke.

‘Do you have any water with you?’ asked the medtech.

‘Yes. Why?’

‘I suggest you drink some and then cool your face and wrists with as much as you can spare.’

Yngwie did as the medtech suggested, feeling slightly better as a result, but not much. ‘Oh hell!’ he exclaimed. ‘The fire’s too close. The wind has sprung up and changed direction. Sorry... I need to get us out of here. You can keep track of my comlink, can’t you?’

‘Yes, we’ll keep a close eye on you, don’t worry. Do you know which direction to go?’

‘I do...’ replied Yngwie, before shoving the comlink into his shirt pocket and then manoeuvring Shahid onto his shoulders. Holding him tightly, he began walking, trying hard not to think about what would happen if the approaching fire caught them. After almost a kilometre, Yngwie was close to collapse. He stumbled, regained his balance, and as he did, saw two ambutechs approaching. One of them gripped his shoulder to reassure him, then helped each other lift Shahid onto the hoverbed they had brought with them. A quick, but meticulous, examination showed that Shahid had indeed been bitten by a spider, which in all likelihood sounded like some species of funnel-web, even though they were not normally found in the region, other than an innocuous, relatively small variety.

‘Right,’ said the taller of the two ambutechs as he administered the antivenom, ‘this should do it, though I don’t imagine he’ll wake up for a while.’

‘With all these trees and so much undergrowth, I think it’d be best if we carry him, rather than try to use the hoverbed, don’t you?’ suggested the second ambutech.

‘Yes, I do, so let’s get going. We don’t have much time. Can you manage to walk, young fellow?’ he said, addressing Yngwie.

Yngwie stood up from where he had been sitting, resting his back against a tree. ‘Yes, I can manage. It’s not far.’ He staggered slightly, then straightened his shoulders and tried to smile.

‘Good man. I’ll go first, you follow, and my mate here can follow on after you. Okay?’ and with that, the ambutech, who was now carrying Shahid over his shoulders, walked on at a brisk pace, with the others close behind.

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Once they reached the waiting ambulance, Yngwie looked back and saw the firefighters were already tackling the flames, which, fortunately, hadn't reached into the treetops. However, this was no time to linger, so when Shahid was safely strapped in and everyone was inside, the ambulance lifted off and shortly afterwards landed outside the main entrance to the Ferntree Gully medcentre.

'There, you should be feeling better now,' announced the practitioner treating Yngwie. 'Your nose, throat and lungs don't seem to have sustained any lasting damage. Your blood pressure is normal now too, so you're ready to go home.'

'Thank you,' replied Yngwie, standing up. 'Are you able to tell me whether the man I came in with is recovering?'

'Ah, yes... It seems I have you to thank for saving my son's life. It's his Namingday today, too. It would have been doubly tragic if it had also been the day he died.' The practitioner hesitated, making an effort to control his voice. After taking a deep breath, he managed to say, 'We intended to celebrate this evening, but will need to do it another day. My bondmate and I would be glad if you could join us when Shahid has recovered.' He put his head to one side and smiled, holding out his hand.

'I did what anyone would do,' replied Yngwie, raising his eyebrows in surprise, but returning the smile and taking the offered hand in a firm grip.

'Perhaps, but not everyone would have the strength to carry him so far. It's just as well the spider bit him through his clothing. Otherwise he might have died immediately, or else soon afterwards from having to be moved before pressure bandaging could be applied. We'll need to investigate though, because I've never heard of this type of thing happening here in Melbourne. People are sometimes bitten by other spiders, but none as venomous as this one.'

'What do you think it was?'

'We agree with the ambutechs that it was most likely some type of funnel-web...possibly a male. Apparently at this time of year they tend to wander around during the night searching for a mate, and if they haven't managed to return to their burrows by morning, hide somewhere dark and damp. Shahid must have knelt down just where the spider was hiding.' The practitioner looked away for a moment, frowning, then shook his head and said, 'Would you like to visit him tomorrow, when he'll no doubt be in better shape to thank you himself?'

'Why, yes, that sounds fine,' said Yngwie. 'Could you tell him I'll come back at around 14:00?' By then he and Torleif would know how their

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'experiment' was progressing, although it would take a full twenty-four hours to complete.

'Good, good... Thank you again, and we'll look forward to your visiting us when Shahid is home, which we anticipate will be in a few days time...assuming you intend to stay in Melbourne that long?'

'Oh yes, I have places I want to see and the communal house is very comfortable.' Yngwie smiled, and then the practitioner left to see to his other patients. After he had gone, Yngwie checked his comlink: 16:42. Excellent... There was enough time for a brief nap before the evening meal, which would be followed by a long sleepless night tracking the cascade.