Chimps

Ethan warmed his hands on a cup of coffee and sniffed the aroma. He was leaning back in a chair in a small room, surrounded by electronic equipment and TV monitors. On one of the overhead screens a video was playing showing a troop of chimpanzees. This was not a movie, or a documentary on chimp behaviour, but part of an experiment on chimp problem-solving behaviour. A group of chimps – one dominant male, two subordinate males, three females and two infants – was attempting to solve a puzzle. The puzzle consisted of a jumble of plastic cubes varying in size from half to one and a half metres across. They could only be slotted together in a certain way – the largest cubes on the bottom and the smallest on the top. When completed, the cubes formed a rectangular step pyramid with a flat top, three metres high. Two metres higher, a bunch of bananas was suspended from the roof. Even if the chimps completed the pyramid, no matter how high they jumped, they still could not reach the bananas.

The bananas could only be pulled down if one chimp stood on all fours on top of the pyramid and allowed another chimp to climb on his or her back to reach them. This would require an unprecedented level of co-operation and planning. Yet, in front of his eyes, Big Mac, the dominant male chimp, was standing on the apex of the pyramid hooting and waving his arms at the rest of the troop as if signalling them to climb up and join him. After nearly a minute of watching his display, the dominant female climbed up the pyramid and stood next to Big Mac. After more hooting and waving, Big Mac crouched down on all fours and allowed the female to climb on his back. After several seconds, where they both nearly lost their balance, the female managed to carefully stretch up and reach the bunch of bananas, then, one by one, began plucking bananas from the bunch. Surely at this point, Ethan thought, with several bananas firmly in her grasp, she would jump down and run off to a corner of the enclosure to consume her prize. Instead, to his amazement, two juvenile chimps climbed onto the pyramid. One stopped halfway up and the second climbed up next to Big Mac. The female then carefully handed each plucked banana to the juvenile, standing next to Big Mac, who passed it down to the second juvenile below. When all the bananas had been plucked from the bunch, they climbed down together, and after some further hooting and hand waving, divided the bananas up amongst themselves.

Ethan took another sip of coffee and quickly tapped all his observations into his tablet. The chimps had assembled the cubes in less than twenty minutes, and it had taken just over two minutes of hand waving and hooting to deduce that one of them needed to climb onto another's back to reach the bananas. That in itself was amazing. This same group of chimps had been given this task a month earlier. The cubes had initially been piled on top of each other in a haphazard order. When the alpha male had tried to climb on top of them, the cubes collapsed. There ensued a round of frustrated and aggressive behaviour, largely by the alpha male, who loved bananas. Baring his teeth and screeching loudly, he vented his anger by chasing the other members of the troop around the closure. Cubes were also dragged or flung around the room, arms were thrown up in the air and lips were bunched in ferocious scowls. Eventually, when he lost all hope of reaching the food, he calmed down and exhibited more social grooming and hugging behaviour. This same test had also been carried out on another group of chimps, with similar results. It only served to emphasize the extraordinary behaviour that Ethan had just witnessed.

Still shaking his head in disbelief, Ethan drained the rest of his coffee. It was late, and he realized that his last meal had been more than six hours earlier – a hamburger hastily snatched from the company canteen on the way to the lab. He climbed to his feet

and stretched in front of one of the dark glass windows that ringed the room. His reflection was certainly nothing to write home about these days. Still only in his mid-thirties, he was of average height with a bulging gut and thinning hair. Ten years ago, he had cut quite a different figure. Regularly working out in the gym and playing for the local rugby team, his physique, although never chiselled, had a well-muscled look to it. However, work pressures and rugby injuries had curbed his exercise regimen, and over the years, his muscles had gradually softened to flab. Now he needed glasses to see at a distance, and only ran if he was about to miss a bus. Depressing…and he knew he only had himself to blame. He should have curbed his eating habits and exercised more. The thought of food sent him rummaging through his backpack for something to eat. He eventually found a muesli bar squashed between two hardcover textbooks. It looked like an elongated pancake. He squeezed the contents into his mouth – still tasted good though.

After emptying the last crumbs of the bar into his mouth, he checked through his notes. The results were still hard to fathom. Why would switching off six genes transform chimp behaviour so completely? If only he could get inside their heads and understand how their thought processes had changed. The chimps would undergo batteries of psychological and diagnostic tests in the coming days. Maybe these would point to a way forward.

Next to his backpack lay a pile of papers on RNA interference, which he planned to read tonight. This was the breakthrough science behind what he had just witnessed. The genesis of this work had been twelve…no, fifteen years ago, he recalled. Back then, he was a young postdoctoral fellow at Stanford University. His professor, a well-known molecular biologist, had a team of postdocs, PhDs and honours students working on ways to switch off cancer-causing genes. One of the most promising techniques involved using molecules called small interfering ribonucleic acids (siRNAs). These molecules were part of the machinery used by the cell to produce proteins, but they could also be modified to switch off cancer-causing genes. Ethan still remembered the experiments vividly. He had found a number of genes that appeared to be pivotal in the development of prostate cancer. After nearly a year, he had managed to design and produce a cocktail of siRNAs and chemically bind them to a lipid-like compound that allowed them to selectively and rapidly diffuse through cancer cell membranes. This chemically modified siRNA cocktail was mixed with a culture of rapidly dividing cancer cells and incubated overnight. He remembered his excitement the next day when he pulled the flask from the incubator. All that was left of the cancer cells was debris, and the control culture, consisting of normal cells that had also been treated with the same siRNA cocktail, remained viable – there was no detectable cell death. The result had blown him away. He remembered rushing into the professor's office with the culture of dead cancer cells still in his hand and the brief look of incomprehension on the professor's face before he could decipher his excited babble, followed by the big, beaming smile that lit up his craggy features. This was one of his most treasured memories, and probably the highlight of his career so far. He still remembered the cell counts of the two cultures – cancer cells 348 cells/ml; control cells 2,000,000 cells/ml. More than a 99% reduction – rarely was science so clear-cut. However, destroying cancer cells in a culture flask proved to be vastly different from destroying them in a human subject. Years of follow-up work ensued; grant applications, publishing papers, co-ordinating fellow workers and students, collaborations, overseas presentations at international conferences and, eventually, mouse trials. There were many setbacks. For one thing, when the siRNA cocktail was tested in mouse models, the siRNAs were quickly degraded by the immune system of the mouse, so few reached their targeted tumours. This degradation also varied from mouse

to mouse, making the treatment unreliable. Another problem was that not all tumours responded to the cocktail of siRNAs. Many years later, a colleague discovered that the siRNAs switched off a number of protein synthesis and regulatory pathways, but other host genes were capable of adapting to similar functions, so the tumours soon began to grow again. This was a well-known and frustrating part of working with the complexities of mammalian cells – switching off one molecular pathway merely activated another. The redundancy was enormous. These problems finally dragged the project to a standstill. The papers dried up, followed by the grants. Finally, colleagues began drifting away to more promising projects.

However, science, like life, is unpredictable. Six years earlier, Ethan had been contacted by a Dr Ashton. He wanted to use Ethan's modified siRNA technology for an entirely different purpose. Dr Ashton wasn't even a molecular biologist, nor a protein chemist, but a psychologist. He had been working on a project for more than twenty years, initiated by concerns at the increasing amount of corporate fraud around the world. This corruption cost the international community countless billions of dollars each year. Investigations into the housing sub-prime crisis, stock market crashes and corporate accounting and environmental practices had found that sociopathic behaviour was rife among the corporate elite. Indeed, the culture of large corporations generally encouraged it. One way of solving this problem was to screen out potential sociopaths at the interview stage, with the hope that eventually more socially responsible people would take the reins of large corporations, and a more responsible corporate climate would emerge. To this end, a series of tests had been developed to screen potential employees. A number of large corporations and many public service sectors were persuaded to include these tests in their interview processes. However, the tests were abandoned when it became apparent that corporations were actually using these tests to select and employ sociopaths for jobs that required ruthless and callous behaviour.

The data from these tests, however, spawned other lines of enquiry. Several types of sociopathic personalities emerged that could be grouped into various personality types. One particular type appeared to be the most dangerous. These people were above average intelligence, outwardly charming, witty, and extremely confident in their abilities, even showing empathy when presented with certain scenarios by the interviewer. However, when their curriculum vitae and references were thoroughly checked, they were found to have made grandiose claims about their abilities, showed callousness and manipulating behaviour in their past workplaces and had a history of unstable, short relationships. Dr Ashton's research group had focused on these individuals for more than twenty years.

During that time, many of these people had moved rapidly upwards through the ranks of the corporate world, with many becoming chief executive officers or chairpersons of large companies. Their behaviour, however, remained unchanged. A trail of broken marriages, affairs, lies, bullying, unethical corporate decisions and manipulation of colleagues marked many of their careers.

Dr Ashton, who was now Head of Research at Atlas Corporation, a company devoted to the development of new therapies and drugs for human behaviour defects, had approached the families of these sociopaths when they died. Under the guise of conducting research into the brains of successful people, he had asked for permission to take samples for an important scientific study. Most relatives were happy to oblige. He also began collecting samples from the brains of known sociopaths who had died in prison. These samples were compared with control samples taken from people who had shown no sociopathic behaviour during their lives. Specific regions of the brain, such as the amygdala and limbic regions, which were known to have different activation patterns

in sociopaths compared with normal people, were targeted. Samples were taken and proteomic techniques used to display the protein profile of the two groups. Six proteins were consistently upregulated in the sociopaths' brains. These proteins could be tracked back to their genes, so they were left with six candidate genes that appeared to be overexpressed in sociopaths and needed to be switched off to determine whether this behaviour could be remediated. Ethan's modified siRNA technique was perfect for this. If a siRNA cocktail against these genes could be genetically engineered to shut them down, in theory, sociopathic behaviour could also be switched off in humans.

Enticed by the promise of unlimited research funds, his own research group, and a substantial salary package, Ethan had made the move from the university to Atlas five-and-a half years ago. His job description was to design modified siRNAs that could shut down these genes in humans was right up his alley. Five years of hard slog later, his siRNA treatment was finally being tested in chimpanzees. If this worked, the next step would be human trials.

Ethan gathered up his papers and stuffed them into his backpack. It was 6 pm, and the light was beginning to fade outside. His mind turned to his girlfriend, Ella. The thought of her brought mixed feelings. He still loved her; he knew that. However, that love had changed during the six years he had known her. That bubbly, funny, beautiful woman he had fallen in love with had disappeared. The replacement was often cold, indifferent and extremely critical of everything he did. And there was something else. She now watched him out of the corner of her eye with a measure of disdain that he had never seen before. It made him sad. At first, he had tried to suggest activities they could do together, plays, movies, football matches, but she seemed completely disinterested. Instead, she seemed to retreat further into her hobby and passion – sketching people in charcoal or crayon. Something he could never participate in, since he was hopeless at art. Now they talked less, had sex less, and when they did, it seemed more mechanical than passionate, like doing the washing up after dinner. They were like two boats drifting apart in the tide, and he had no way of bringing them back together again. These days the fear of losing her was never far from his thoughts.

He shouldered his backpack and switched off the lights. Even though it was late, there were still plenty of people in the building. He closed the door and punched in the code to set the alarm. The audio-visual lab was at the end of a long, fluorescent-lit corridor with labs on either side. Most of the labs were still occupied, which was normal, as the company allowed flexible working hours for their lab staff, since many experiments required round-the-clock monitoring. This was something Ethan enjoyed about working for a large biotech company; he could come in at any time and still find someone to talk to over coffee. He reached the main entrance and let the computer scan his face. Once the facial recognition software had identified him, the words "Good night, Dr Hendersen" appeared on the overhead screen.

Ethan took a few steps into the gathering twilight. It was late autumn. The leaves on the trees were beginning to crisp into browns and reds and flutter down in the breeze. Tonight, the breeze had a chill to it. He dropped his backpack onto the ground and took out a jumper. He remembered the forecast for the day. A cold front was moving across the mountains and was due to hit Sydney in the late evening. Dark cumulus clouds were already gathering to the west. He pulled on his jumper and turned eastward towards the city. In the twilight, the moon was clearly visible poking above the city buildings, still tinged with the orange glow of the sun. It was nearly full. Ella said she always felt horny on a full moon, but going on her latest behaviour, that was a very unlikely scenario.

They lived on the fifth floor of a high-rise apartment block. The apartment boasted expansive views of the Sydney Harbour Bridge and the Opera House, a privilege the

tenants paid for dearly via high rents and strata title fees. He would never have been able to afford the place on university wages, and somewhat resented the monthly dent in his account balance, but Ella loved the views and the convenience of having the city at her doorstep. For him though, the traffic, pollution and noise of the place had long since surpassed the benefits.

It was a brisk fifteen-minute walk from work through the local shopping mall, taking him through a food hall with a large selection of local restaurants and cafés. One of the advantages of living in Australia was the sheer variety of cultures on one's doorstep, each represented by a different cuisine. On the way through the mall, he paused among the cluster of food stalls and restaurants, taking in the different aromas. The muesli bar had done nothing to dent his appetite. On impulse, he decided to buy some takeaway Thai food. He phoned Ella, but there was no answer. Ella wasn't one for cooking, but he figured that if she didn't want it, he'd eat her portion.

He reached the apartment ten minutes later and opened the door. Ella was sitting cross-legged on the lounge-room floor, bent over a sketchpad. She was still dressed in her work clothes, a pale-green, low-cut top and tight-fitting pants, but her feet were bare. A pair of bright-red shoes was poking out from beneath the couch. All around her was an assortment of crayons and pencils. This was one of her hobbies, sketching famous athletes, usually performing in their chosen sport. The walls of the lounge were filled with her sketches. Just about all the major sports were represented; soccer, tennis, athletics, swimming, rugby. Each drawing was a famous sportsman or sportswoman sketched in some type of action pose. He loved the drawings, which added a sense of movement and energy to the room.

Despite his noisy entrance, she only gave him a quick sideways glance. She was wearing eyeliner and eye shadow again, something she had only started doing recently. He found it annoying, since it was clearly nothing to do with him. He dumped his backpack on the couch and the food on a bench in the open-plan kitchen.

"I brought some takeaway," he said, trying to sound cheerful as he walked over to her. She had sketched the outline of a woman smashing a tennis ball over a net.

"Nice."

She looked down at his shoes. "You should have taken off your shoes when you came in."

"Huh?"

"And the couch is not a dumping ground for your pack."

"Ah…sorry." This was going to be one of those nights, he thought miserably. "Had a bad day?"

"Not till I came home and found the mess you left behind this morning."

"What mess?"

"What mess?' Is that a serious question?"

Ethan had a quick glance around the lounge room and kitchen, looking for the source of her accusations. "You mean the dirty dishes?"

"I mean the clothes scattered around the bedroom, the dirty dishes, the mess in the bathroom…it's like living with someone who was brought up in a barn."

"Alright," Ethan held up his hands. "I'm sorry, I'll try to do better next time."

"Try?" She flicked back her shoulder-length hair and glared at him. "You have been saying that for the last year and nothing has changed. Look at you; tattered jeans and a faded T-shirt. You are supposed to be a team leader. I'm embarrassed to go out with you."

Ethan opened his mouth to speak but thought better of it. He knew full well how these arguments went. The insults would become more personal, more emotional,

eventually bordering on hysteria. “I know I’m not perfect,” he said, as they glared at each other, “but I’ve been really busy with work.”

“You’re always busy with work. That’s your excuse for everything. Your get-out-of-gaol-free card.”

“It happens to be true.”

“Well I happen to have a job as well, which also keeps me very busy, but I don’t leave my clothes everywhere, forget to wash up, and leave the bathroom filthy. I also manage to dress properly every day and don’t go around looking like a hobo.”

Ethan knew this wasn’t true. Ella was tidier than him – that was true – but he always considered himself a tidy person. And he worked in a lab; everyone dressed in T-shirts and jeans when they worked in a lab.

“No, you dress beautifully in low-cut dresses that hug your figure. But you work in a lab, the same as I do. It amazes me why you bother.”

“I have pride in my appearance and I look after my figure.”

Ethan noticed the disdain with which she scanned his body. “Are you saying I’m fat?”

“Aren’t you?”

“I’m a little overweight.”

“Huh…the master of understatement. I suppose you will now say that you will try to lose weight. Well, we both know how that will turn out.”

A flush of anger gripped Ethan. “All you think about is yourself, your looks and your clothes. There are more important things than personal vanity.”

This drew a thin smile. “Maybe for you, but not for other men.”

“What’s that supposed to mean?”

“It means I’m fed up with you!”

With that, Ella sprang to her feet and pushed past him.

“What about the takeaway,” he called after her as she disappeared into the bedroom.

Moments later, she emerged from the bedroom carrying a suitcase. “I’m leaving you.”

“What? Don’t be ridiculous.”

“I’m fed up with all your mess and your complete indifference. Half the time I don’t even think you know I exist.”

“You can’t leave just because of a little mess,” he countered.

“No I’m leaving because of a big mess that never gets cleaned up.”

She had that hard, stony look she got whenever she had set her mind on something.

“Where are you going to go?” he asked, watching her pull her red shoes out from beneath the couch and quickly strap them on.

“Away from you,” was all she said, opening the door and disappearing down the corridor.

It didn’t take Ethan long to realize that it had all been planned. Most of her clothes were gone, and all of her personal items. Because she had moved in with him, he owned all the furniture. He searched every cupboard and drawer – there were only some drawing materials, some old clothes that Ella never wore anyway, and her drawings still hanging on the lounge room walls. The drawings in the bedroom were gone. The empty frames lay scattered on the floor beside the bed, carelessly discarded once the pictures had been removed. He realized with mounting dismay that the sum of her existence with him could be squeezed into a single suitcase.

It was a long time before he could wrap his thoughts around what had just happened. The staged calculation hurt the most, the desertion without even trying to reason through their problems. After the initial shock had subsided, he tried to phone her, but there was

no answer. He was left staring blankly at the walls in the bedroom, with only his own misery for company.

She will calm down and contact me in the morning, he reasoned after a while. People don't just break up on impulse. She will come to her senses, and then we can have a rational discussion about our relationship. This was just a shock tactic to make him sit up and take notice. And she was right; he had been ignoring her, taking her for granted. He had a shower, comforting himself with these thoughts. He decided that he would suggest a holiday when everything was sorted out. The mountains would be good, a villa with spectacular views, romantic dinners and good wine. He spent the rest of the night reasoning through all the possible complaints that she could level at him. It would all be fine, he thought, before climbing into bed and drifting off to sleep.