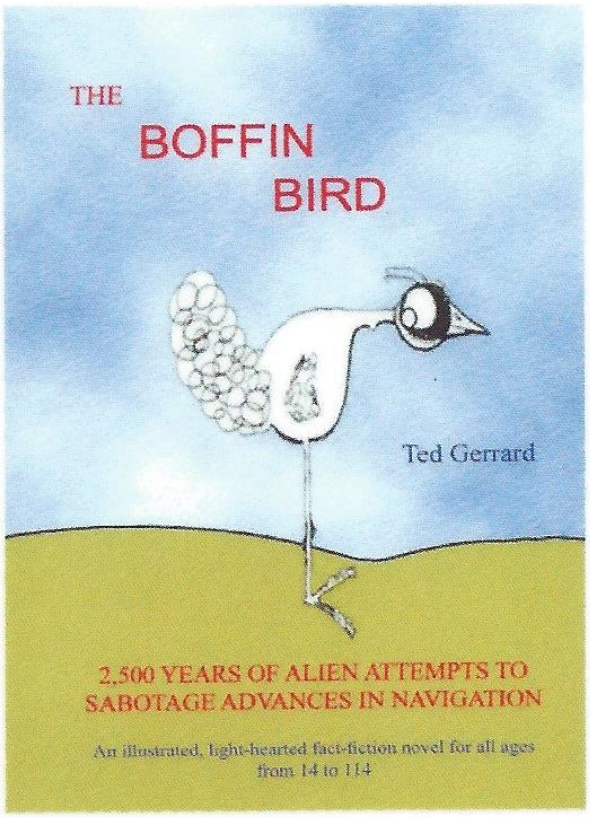

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THE NAVIGATOR
TRILOGY

BOOK TWO

THE BOFFIN BIRD

2,500 YEARS OF ALIEN ATTEMPTS TO SABOTAGE ADVANCES IN NAVIGATION

TED GERRARD

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ANNE GERRARD 1934-2019

My wife Anne, died after a long fight against motor neurone disease, a fight we knew she would never win.

It was her idea to launch the free PDF editions of my Navigator Trilogy books *Astronomical Minds* (2007) *The Boffin Bird* (2009) and *The Cuckoo Paradox* (2015).

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PROLOGUE

LONG AGO AND FAR AWAY

The alarm fails to waken you, you cut yourself shaving, you burn the toast which then falls to the floor butter side down and you trip over the cat as you attempt to clear up the mess. And the day has only just started. Murphy's Law which states that anything that can go wrong, will go wrong, is in full flow. Although Murphy's Law has been used as a base for many hilarious TV Sitcoms, it should not be taken lightly and neither should it be assumed that such serial disasters are unique to planet Earth.

On a planet in a distant solar system, life had already evolved to a high degree before atmospheric pollution triggered global warming. The ice caps melted which caused widespread flooding. Lacking reflective snow cover, radiation levels increased alarmingly, as did volcanic activity. These events wiped out nearly all the land-based flora and fauna and forced the advanced species to live mostly underground. Then a close encounter with of a large lump of dark matter resulted in the oceans being sucked into space and what was left of the atmosphere was insufficient to prevent a further huge increase in radiation levels. All but two of the remaining species were wiped out leaving only rock-eating microbes tens of kilometres beneath the now hostile surface happily munching rock and the few members of the very advanced species living in deep radiation-proof shelters.

Over many generations this advanced species somehow survived and even managed to multiply. But they had nowhere to safely dispose of the radioactive waste from their generators so their scientists decided to load this into a large rocket and blast it towards their sun. The launch misfired and the rocket nose-dived into one of the atomic power stations. This left less than 100,000 inhabitants in one underground city as the sole survivors of the advanced species and many of the microbes with headaches. Scientists replaced the old nuclear fission power plants with advanced nuclear fusion generators

which would have solved the global warming problem had the planet not already warmed up. This would also have solved the atmospheric pollution problem, had there been any atmosphere left to pollute. A missile defence system to deflect or destroy approaching asteroids was set up at vast expense only for several of the early-warning satellites to collide, leaving so much debris orbiting the planet that asteroids could no longer be detected with any certainty.

At this point in the Murphy saga, the planet's President-for-life had a brainwave. Brainwaves were common occurrences amongst this advanced species given that most of their conversations were by extra sensory perception - ESP. They communicated by speech only in crowded meetings where thoughts were difficult to convey unless everyone was paying attention and not all thinking back at the same time. But the President's brainwave, so he fondly imagined, was brilliant. The scientific advisor to the President (SAP) called a special meeting and the President read out his decree to a packed audience.

"The reason our planet is in trouble yet again is because all our scientists have been so focused on projects which have brought individual fame and fortune to them and their financiers that they have put the State at risk.

From now on all scientists must only work on projects which cannot in any way endanger our planet, and in order to prevent unauthorized research I propose to set them a task which will keep them all, and I do mean all, fully occupied for hundreds if not thousands of years.

There are tens of thousands of planets in our part of the Galaxy suitable for supporting life. As you all know, for hundreds of years we have carried out a listening watch - all to no avail and clearly none of these planets have reached the space age. So we will try a new approach.

Since entering the space age we have become a great danger to ourselves. Therefore our scientists are to design a computer-controlled inter-stellar space programme to be manned entirely by robots, with the object of seeking out intelligent life on other planets. If intelligent life is located they are to be prevented from making scientific discoveries in the fields of navigation and astronomy which could otherwise result in them developing their own space programmes and following our disastrous course and

destroying their planet. The space- probe must not be permitted to land on any planet where life has been detected; should it do so it must be programmed to self- destruct. The inter-stellar craft will be micro-miniaturised. For our own safety nothing larger than the size of an eyeball is to leave the surface of this planet – ever again."

Immediately following the Presidential decree SAP also had a brainwave; not the brilliant sort but the hasty born-out-of-desperation sort. He immediately thought to the President that a scientist known as the Boffin should be put in charge of the President's project and that he, SAP should personally act as overseeing project manager. SAP was careful not to divulge that this plan would enable him to secretly continue with his own research; he was well on the way to producing an everlasting life machine which naturally enough he intended to use exclusively to prolong his own life. The President decided to check on the Boffin first.

Every adult on the planet possessed his or her own robot and all these were by law, identical. On the death of its owner the robot was automatically trashed and recycled. These robots were pre-programmed never to take life, could never replicate themselves and could not think intuitively. They communicated with their owners and each other by thought transfer. But the Boffin's personal robot, although appearing identical to all the other thousands of large door stops that usually bounced after their owners like glorified pogo sticks, had been modified. Because the Boffin had written the computer software for all the Personal Robot construction programmes, he had been secretly able to illegally upgrade his own robot's software from time to time.

The Boffin and his robot had between them produced a mathematical theory which suggested that matter could travel faster than the speed of light - the speed of dark. SAP could not understand the figures which is why he did not know that the Boffin was well on the way to inventing a practical method of travelling at enormous speed across the Galaxy. Which is why the President did not know either.

The Boffin, like many lucky geniuses, had received confirmation of his mathematical theory by mistake. Some years ago an anti-asteroid missile test firing had run wild. Instead of going into the planned parking orbit, it skidded along the outer edge of the planet's thin atmosphere and then disappeared from the controller's screen. Then as suddenly as it had vanished it reappeared, bounced off the top layer of the upper atmosphere and nose-dived into a remote area of desert. Apparently the newly developed skin coating of the rocket had heated up to an alarming degree at which point the rocket had mysteriously speeded up to over one and a half times the speed of light. It then completed seven orbits of the planet in next to no time.

According to the recovered flight data box the outer layer of atoms of the new coating material had created some sort of light- proof tunnel which pushed out in front of the rocket. The missile would then accelerate to enormous speed within the blink of an eye without any effort. The only reason that it had not disappeared into the nether regions of the Galaxy was that the tunnel had smashed through a previous orbit of itself and let the light in, slowing the rocket again. Either that or the tunnel was not completely light-proof.

The Boffin's advanced mathematical model indicated that the faintest glimmer of light at the leading edge of the tunnel would slow the craft down just enough to enable it to be directed somewhere useful, or even actually stop it. In precisely the same way in which the rogue missile had been slowed and stopped. So a miniature rocket could be carefully aimed at a specific distant target and its computer programmed to let a tiny smidgen of light in at the front end, keeping the speed manageable; maybe 100 or on long journeys 1,000 times the speed of light. Then when the probe reached its target star, the light from the star would become so bright that it would prevent further tunnel formation and stop (or at least slow) the craft. The Boffin then designed an on-board re-launch system to enable the craft to return home in a similar manner. At this point in his research came the announcement of President's brainwave and his decision to pay the Boffin a visit.

The President came straight to the point, thinking *"I understand that many of your colleagues consider you capable of establishing a Galaxy-wide search for life. Then, if and when you find it, being able to prevent those animal forms from advancing to a level where they could be a danger to their own or anyone else's planet; all in accordance with the rules I have set?"*

So the Boffin thought him up to date - more or less. He was happy to explain how a probe could detect life on a planet without a close approach. Even the most primitive life form consumed something. It also had to get rid of that something to make enough room for it to consume some more (the Boffin knew nothing of the rock-eating microbes 10 kilometres beneath his feet). The natural simple gases of any planet's atmosphere are converted into complicated gases by living things. Such changes should be detectable from anywhere in any solar system without having to actually pay a visit to each and every planet. Only if changes were detected, would the probe be required to investigate.

The President was happy to appoint the Boffin to head the research team, as were the rest of the population. At least the scientists were now too preoccupied to make any dangerous discoveries and matters would hopefully stay that way. His directive would surely be impossible to comply with.

But the Boffin, concerned that his President would alter the rules if he thought his project achievable, had neglected to fully inform him. He did not mention his "speed of dark" research or that he had already worked out how to compress atoms in order to miniaturise the probe and its entire contents. He did not mention either how he planned to circumvent the President's directive regarding the influencing of a planet's intelligent species without being able to land. Here it was his robot which had produced the answer because the Boffin's longstanding unauthorised programming had produced a personal robot capable of drawing attention to ideas which he had missed because they were locked in his subconscious.

"When I wear out a part or break something, like the spring in my foot, I automatically replace it," the robot thought. *"I am programmed to do this. I could even reproduce another complete robot, an exact copy of myself, if you had not written my computer software so as to prevent this."*

This software prevented robots from reproducing millions of replicas and possibly taking over the planet, but the Boffin immediately realised where these thoughts were leading, but kindly let his servant continue.

"There are many types of robots in addition to the personal servant type and each can replace bits. So it stands to reason that the computer software exists which can permit one type of robot to reproduce a different type. Surely you can tinker with the reproducing software on the space probe micro-robots so that they can manufacture some kind of disposable robot that can be sent down from the spacecraft to the surface of any planet to investigate?" . He had often wondered what other knowledge he possessed that he remained unaware of? Without his specially programmed assistant to point out whatever his overloaded brain had missed, vital new discoveries might never come to light.

Like many geniuses, the Boffin lived in fear of dying before he had time to discover everything he was capable of discovering. But if his robot was *not* automatically trashed on his death, his potential ideas might actually live on? There was a snag to this line of reasoning. Although he might be able to alter the software that otherwise eliminated his robot when he died, who would adopt it? Everybody already had one or was presented with a newly minted one on reaching adulthood. In any case he really wanted his genius potential to live for ever, not just for one more generation. This time the Boffin worked out the answer without any help from his robot.

He wrote an entirely new and completely illegal computer programme. At a point when his death was imminent, his robot would automatically download its entire computer programme into that of the nearest robot a split second before it itself was trashed. That programme would be self repeating, rather like a computer virus. On the imminent death of the next robot owner, that robot would download also and so on for ever. That way the Boffin's genius potential would also live on for ever. Unless of course the entire planet was destroyed! But even a genius could not make allowances for every last eventuality, or could he?

There was no celebration to mark the day on which the first two miniaturised spacecraft emerged from the production line because the President had been assured these were merely test prototypes. But there were numerous complaints from the robot lifters over the weight. To stop them from lodging a formal protest and possibly drawing attention to the dangers of launching a massively heavy eye-ball sized craft, atoms compacted to the limit, the Boffin had to ask his personal robot to have a quiet word with the robot in charge of the lifting team.

What passed between them was not revealed but there were no more complaints. The next day the robot in charge of the lifting team reported for work, proudly wearing a bright new fluorescent orange outer casing with matching mauve foot covering.

At long last the date of the first test launch was announced and the huge underground research centre constructed specially for the Seeking Life On Planets research project (SLOP) was made ready. At this point, despite, or rather because of, the President's brainwave, Murphy's Law struck once again.

On launch night minus one, the individual in charge of the near space defence watch reported a large unidentified object heading towards the planet. He predicted that it was on a collision course and would impact in less than three days unless diverted. The time to impact prediction was vague as were the details of the object. This was because the controller of the near space defence watch was a civil servant ever since the President had ordered every scientist on the planet to concentrate on his project all those years ago.

There were no anti-asteroid defence missiles because these had been de- commissioned when the President had decreed that nothing larger than an eyeball must leave the planet. There was no equipment to compute the trajectory accurately because the satellites which had collided had not been replaced for the same reason.

Consequently there was no way to map the asteroid's surface or estimate its dimensions and weight. In the old days the incoming object would have been recorded, tracked and destroyed or deflected months ago.

What remained of the ancient tracking equipment was hastily set up, which made matters worse, not better. The time to impact was found to be only 27 hours and 5 minutes! As the object appeared to be a massive asteroid 200 miles long and 40 miles wide, this gave every inhabitant on the planet just over a day to live. Most would have preferred not to have been informed.

With the planet otherwise defenceless, the Boffin suggested firing the first of "his" new tiny spacecraft on a trajectory so as to pass close by the asteroid. He reasoned that as they really understood little about the thickness of the dark tunnel that would surround the probe, the tunnel might deflect the asteroid from its otherwise catastrophic path.

SAP, who knew nothing about dark tunnels and the speed of dark thought this idea ridiculous. In his opinion the asteroid would miss the planet anyway and they were panicking unnecessarily.

When SAP viewed the picture of the massive asteroid on the tracker screen he changed his mind. So the first probe was hastily prepared and aimed to miss the asteroid by a fraction.

At this point, the Boffin's robot, eminently better informed than SAP, realising its master and everyone else were about to be eliminated by the incoming asteroid, triggered its special software transference to the only other robot likely to survive and switched into standby mode, mission accomplished.

The tiny spacecraft was hastily loaded into the firing tube, aimed and fired, and although it did indeed miss the incoming asteroid by a fraction as planned, no one saw the event because the tracker screen blanked out for nearly a minute after the launch. When everything was back to normal, there was the asteroid, still on the same collision course.

With everyone now in a real panic SAP took control. The only option left was to fire the other probe straight at the asteroid. *"Blast it to smithereens in a jiffy"* he confidently thought to the anxious gathering. The Boffin was horrified.

"No it will simply drill a hole straight through the asteroid at the speed it will be travelling at. There is no certainty that the asteroid will not somehow be engulfed in the tunnel of dark and shoot straight back down it and into our planet at an even faster speed."

Again SAP over-ruled the Boffin. *"No, no, fire the thing at once."* The order carried the weight of a commander in charge, although the Boffin made no effort to hide his own thought of this order. *"About as effective as firing SAP's everlasting life machine at it."*

The second launch simply confirmed the Boffin's opinion. The probe drilled a neat hole right through the asteroid and continued on its way to goodness only knows where. The asteroid was not diverted and smashed straight into the planet precisely above the launch site. The 200 mile deep crater it made split a huge chunk off the planet and ejected thousands of lesser bits and pieces in all directions. It also entirely eliminated one of the most advanced species in the Galaxy.

One particularly large piece of rock was blasted out towards their sun at enormous velocity, was only partly caught by the star's massive gravity, completed most of an orbit and was then flung off into the nether reaches of the Galaxy at even greater speed.

Embedded in its surface were a few bits of SAP's eternal life machine and a portion of the upper casing of the lifting team's chief robot, fluorescent orange glinting in the sunlight as the new mini-asteroid slowly turned summersaults in the void.

Deep inside, a few microbes were still happily living on rock minerals and entirely unaware of their fate.

9

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560BC – 550BC

Having missed the asteroid by a dangerously small amount, the first probe continued to flash though its tunnel of darkness across the Galaxy at about 1,000 times the speed of light, apparently none the worse for wear and unaware that it now had no base to return to.

Because the probe had been aimed to just miss the asteroid and not at any specific star, it could easily have kept on going right out of the Galaxy. But after 10 months the tiny ball was brought up short by the bright light of a rather minor sun lying directly in its path which degraded the tunnel of darkness. Sensing this intrusion, the onboard laser cutters completed the job in a nano second. The probe emerged from the tunnel and slowed rapidly to a little over half the speed of light before automatically firing specially designed retro rockets which gradually brought its speed down further. Then the ball appeared to come to life, pushing all kinds of gadgets out through dimple ports until it looked more like a spiky tree than the most advanced piece of equipment ever invented.

Once most of its compacted insides were outside, the robot in control had space to work. The first task was to establish the probe's position relative to its own sun. This took longer than anticipated because the standard charts of the astro-navigation system could not link this new location with the 500 reference stars. Too many appeared out of position. The long-range back-up charts eventually established that the probe had travelled the equivalent of about 800 light years towards the outer rim of the Galaxy.

The second task involved gas analysis of the nine planets orbiting this sun. Working from the nearest to the sun on outward, the probe's robot obtained a positive reading from the third planet tested. Anyone else would have leapt up and down for joy.

What a fantastic discovery right at the outset of the mission. But the robot controller, not aware of the importance of the discovery and not having been programmed to show emotion, merely proceeded to carry out the rest of the checks. Having obtained no positive responses from any of the other planets or any of their moons, It

proceeded to plan “A”. This decreed that any probe obtaining apositive “life” response to the gas analysis test, must then proceed at best speed to that planet and place itself in a high parking orbit, prior to conducting further tests.

One danger the probe faced on approaching any planet suspected of having living inhabitants was that it might be detected and attacked. So the tiny spacecraft approached the large blue and grey planet with extreme caution, detectors searching for signs of the smallest piece of space junk that might be in orbit, at the same time checking for radio or laser signals. No debris in orbit and no signals of any kind. The planet appeared as dormant as its arid pock-marked moon.

The spacecraft descended to a lower orbit and attempted to detect thoughts from advanced life forms. In theory the robot controller should be able to understand some of these thoughts because the deep subconscious thinks in images as well as words. The controller did immediately detect understandable thoughts, which, although jumbled, seemed to be coming from a group of individuals who were lost and hungry.

Time to check the replicating apparatus which had not been tested in space because of the secrecy and the emergency launch. But the rules were strict. It must be tested before use.

The controller locked the replicator sensor on to the group of objects which appeared to be producing the thoughts, focused on an individual, and pulled the “check copy” lever on the internal replicator.

A simplified miniscule test version of the image popped out of machine right there in the space probe. The controller had no idea what this object was and the object itself had no idea either; it was only another robot after all. It was white, had a long neck, two large eyes and a long thin pointed snout. It appeared to be covered in a kind of soft fluffy material which covered its entire body and its two arms. But its single leg and large flat foot were black and shiny and covered in scales. The foot possessed three very long toes, and on the end of each there was a dangerous-looking sharp claw. At least the replicator system functioned, even though it could not explain what it had made because it was not programmed for two-way thought conversation.

Still proceeding strictly according to the rules laid down by the Boffin, the controller checked that the replicator's external copying unit was fully deployed and pulled the "external full-size version" lever. Now the robot knew what the fluffy material was for. Just outside the viewing port was a massive flying object. It was flapping alongside, a beady eye the size of the entire probe peering in, its single leg trailing away in the distance. It was in constant danger of becoming entangled in the various external gadgets and wrecking the entire project, and the controller had no idea why it was flapping. Why was it not just floating in space like any normal robot would have done?

"Use your thrusters to get further away you clumsy brute" the controller thought furiously. The flapping flying object naturally took the controller's instructions literally, stopped flapping and fell rapidly towards the surface of the planet, thrusters presumably activated.

When this apparition reached the denser atmospheric level it started flapping again and soon discovered that it could actually fly; almost. By the time it had reached the surface it had more or less mastered the entire process and had become sufficiently confident to switch the thrusters off. This proved to be a mistake and before it could switch one on again, it hit the ground with a crunch.

Picking itself up, it scanned the area for thoughts, wondering where the living forms it was a copy of were hiding. Its programmed co-ordinates checked out; it was in the right place. Before it could take avoiding action a thin stick-like object whistled through the undergrowth and buried its tip in the robot's fluffy coating, skidded off the metal casing and jammed against an arm joint. The robot's automatic defence mechanism kicked in and it fired a non-lethal bolt of blue lightning in the general direction of the attack, which set some bushes on fire. At the same time, it shot into the air, hovering well above the undergrowth, searching for its attackers.

Below it were a group of two-legged, two-armed hairy creatures, naked except for skins tied round their waists and looking nothing at all like the robot. However they were certainly thinking and the damaged robot distinctly picked up some very unflattering remarks as the hungry hunters expressed their views on the marksmanship of their leader and urged him to shoot at the "bird" again.

The robot, forbidden by its programming to take life, shot rapidly sideways well out of range and frightened the wits out of a whole flock of objects which appeared somewhat similar in outline to what it could see of itself and also happened to be flying hastily away from the danger.

Being programmed to be particularly observant, the robot rapidly came to several conclusions. The intelligent life forms it was supposed to resemble were completely different, and the forms it presumably was supposed to resemble were also rather different. All these fluffy white flying creatures had two legs and two much smaller feet, smaller eyes and snouts. There also seemed to be a surprising absence of coherent thought amongst the large squawking assembly and absolutely no ability to communicate sensibly about anything.

The confused robot at once reported these discoveries to its controller on board the spacecraft. It would seem, it then added as an uncalled for afterthought, that there had been one or two errors committed by someone somewhere.

The mistake in copying the wrong life form was not easy to explain. Possibly the lesser forms were flying above the intelligent species when the thoughts were being picked up and the replicator had made a wrong identification?

The mistake in providing a single foot was possibly more understandable. All robots had only one large foot and the replicator had perhaps copied an object that appeared to have only one foot because the two legs appeared as one when flying.

"You will just have to manage with what you have. You are not authorised to issue alteration instructions," the control robot thought. *"And just how am I supposed to make contact with a species*

that thinks I would make a good meal?" "Improvise. The hunters may not be the most intelligent species

on this planet. See what your fluffy friends think." The control robot had more important matters to attend to.

The flying robot discovered that the flock of "real" flyers could actually communicate but their level of intelligence was so low that it was difficult to understand. Really little more than a series of disjointed pictures, although they did seem to have identified it as a

male, a “he”. It also soon discovered that the two-legged aggressive hunter beings had given it a name. They thought of it as *“another stalk”*, although it was not obvious why. Possibly because it had a stalk stuck in its arm joint, which they thought of as a *“wing”*.

The robot bird also discovered it had a communication problem with mission control, the spacecraft overhead. The extrasensory perception link between the robot controller and the robot bird worked perfectly but the miniature test copy was also adding its thoughts and confusing everything. After some careful logical consideration, the controller decided that trashing the miniature test version might lead to problems with the external version. So it gave the tiny replica a none too gentle kick with its foot (a difficult manoeuvre for a monopod in a weightless environment) which pushed it behind one of the navigation units.

It also ordered that the flying robot would commence any transmission with *“Stalk here”* and mission control would think *“Controller here”*. After a heated thought conversation with the fluffy object behind the unit, the Controller reluctantly agreed that the miniature version could use the call sign *“Little Stalk”*, but only if and when it had anything useful to contribute.

So Stalk flew along with the rest of the mob, gradually learning to communicate with them in a primitive sort of way. High overhead, the Controller followed the flock but made no attempt to repair the replicator. The mission was not going according to plan. The Controller had been programmed to seek out the highest intelligence and discover whether they were advanced enough in their knowledge of astronomy and navigation to cause trouble to life forms in other solar systems. Yet here it was, tracking a flock of “birds” that could barely think straight, having passed up the chance of communicating with a life form that most certainly could think very clearly. *“Was this the right approach?”*

Little Stalk, in dire danger of being zapped if it put its only foot wrong, wisely decided not to provide the Controller with an answering thought.

Stalk, having no need to refuel in the immediate future and able to fly at supersonic speed if need be, spent “his” spare time taking in the sights and transmitting the details aloft. These reports suggested that

after all, Stalk might be on the trail of higher intelligence.

Soon the flock encountered a wide river flowing between cultivated banks containing a variety of lower animal forms. Stalk's transmitted images of boats, some with sails and two-legged creatures working on them settled the matter for the Controller; here was proof of intelligent life, albeit simple. As the birds flew along the river, always heading towards the distant north pole of the planet, scattered thoughts from the two-legged animals became more and more frequent. Stalk automatically gave these creatures a wide berth. They were very similar to the one which had shot the primitive missile.

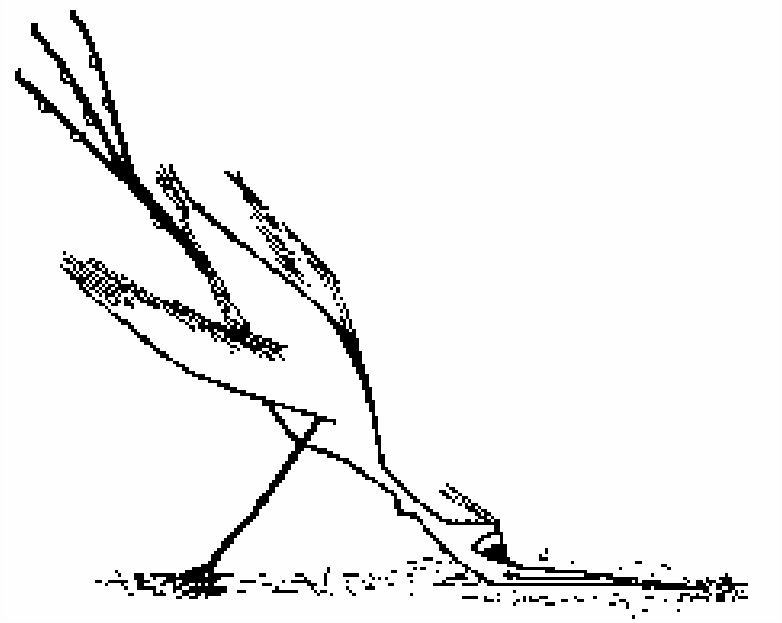
As they travelled north, the surroundings changed and the two-legged animals became more numerous. Next came collections of buildings, some much larger than appeared to be needed to house these beings.

Suddenly the Controller realised it could see artificial features from the spacecraft; progress for the mission at last. No simple creatures could have built these pyramid-shaped buildings. This must have taken skill and intelligence and a great deal of thought.

The Controller passed terse instructions to Stalk. *"Investigate the large structures and attempt to communicate with the builders, but be very careful."* Stalk required no second warning; the missile in his joint was becoming a distinct encumbrance. Often when he tried to land it tripped him up. There were advantages on this planet in possessing two feet.

Early next morning Stalk carefully flew all round the three pyramid-shaped buildings without being able to discover any opening. And no thoughts of any kind coming from inside either. Equally puzzling, none of the people seemed the least interested in these structures and lived in a large ramshackle collection of primitive shelters nearby. It was as if the pyramid structures had been abandoned.

The robot bird decided to land for a closer inspection, tripped on the missile and fell flat on his pointed nose. Before he could pick himself up he was grabbed from behind.



It is difficult to know who was the most surprised, the young man, for that is what had grabbed Stalk, or the robot. The youth expected to capture an injured bird, albeit a large one, but now found himself grappling with an object which was oddly quite stiff and unyielding. Not at all the struggling floppy bird he expected, and inexplicably heavy. The robot bird was clasped firmly in the arms of a two-legged individual dressed in a flowing robe with a head which was covered in long black hair. Because the grappler's thoughts were not of fear or aggression, but of sympathy, the robot's defence mechanisms did not activate.

Stalk, programmed to investigate, thought to the youth that he was not injured and would appreciate being placed on his foot in a standing position as soon as was convenient. Although the young man was confused to receive these thoughts, he did as requested. He then realised he was being asked to remove the stalk, and gently, but with difficulty, pulled the arrow out of the wing joint, surprised at the lack of blood or any sign of injury.

"Thank you, I couldn't get my nose to grip it." Stalk thought.

"That's not a nose it's your beak and that wasn't a stalk, it was an arrow, and how did you lose your leg?" The young man was talking quietly, but wondered how it was that he had understood the bird when it had not said anything. Then he began doubting his sanity and

realised that he would have been even more surprised if the bird had spoken.

But of course Stalk read these concerns and set about thinking that he had been made by mistake to look like a bird, and had then been shot at with a stalk and that he was searching for the door into one of the pyramids so that he could meet the builders. *"And who are you?"*

The young man, quick on the uptake, tried thinking his reply. It worked. His name was Phocus – p h o c u s - and he had been born in Greece, a country across the great sea to the north, but now lived in a small town where this great river met the sea. He was a student of a master mathematician and astronomer by the name of Pythagoras of Samos and had been sent to take measurements of the pyramids in order to assist his master in producing a mathematical formula for triangles. He was not exactly sure what he was supposed to be seeking. *"And what should I call you?"*

"Stalk, the hunters called me and the birds thought me a male. I did not actually lose my leg, I was never made with a second one in the first place."

"But your foot is upside down. The claws are in the right place but those knobbly bits should be on the underside, not the top." Phocus obviously understood how birds feet were constructed even if he knew nothing about geometry.

"Upside down?" thought the robot bird quietly. Then he realised that not only had the replicator possibly produced a single foot because the real bird's two legs had appeared as one when flying but had been confused because the underside of the foot had been uppermost at the time. Not a good start to the mission.

Phocus decided not to be rude by asking or thinking too many questions, or explaining that it was an approximate representation of a Stork and not a Stalk for fear of upsetting this mysterious creature. He wanted to find out more. Perhaps he was a god? He certainly looked a bit like the pictures of the sacred birds he had seen carved on the walls of Egyptian buildings. Yes, that must be it, this peculiar creature is really a male god of some kind. A great white bird god.

Stalk closed his eyes, and transmitted all this information to the Controller, including the god part. He did this very very quickly and

although Phocus felt a flicker of thoughts he failed to pick up any of the details. This was just as well. One god here on the ground beside him would be quite enough to try to cope with. Had he known about the other two high above him in a spacecraft the size of a bird's egg, he might have become a priest there and then and been of little further help to the project.

As it was, he was the first slice of luck the expedition had so far experienced. Apprenticed to an astronomer? Well well.

Stalk promptly changed his call sign to "Bird God" and then vetoed Little Stalk's request to change its own call sign to "Little Bird God". The Controller concluded that the replicators were programming robots to possess ambition as well as manufacturing them with major faults.

The Bird God was also experiencing problems. Confusingly he sometimes visualised Phocus as a "human" and sometimes as a second copy of himself, complete with one leg and an oversize partially upside down foot on the end of it, large eyes and a long beak. Something else wrong with the replicator software programme presumably. He must remember to mention this to the Controller, preferably when least expected.

Phocus, now firmly convinced that he was in the company of a god who was on some kind of special mission to seek out the world's best thinkers, at once took on the job of guide and protector. He was not at all sure that the Great White Bird God was actually in need of protection but had he not been hit by a hunter's arrow? Admittedly the arrow had done no damage but surely any really powerful god would have ripped it out and hurled it straight back at the attacker like a thunderbolt, rather than repeatedly tripping over it?

Bird God had done enough by way of thought influencing to maintain his guide's beliefs, which in fact were not too far from the truth anyway. He was a god of sorts, he was on a mission to meet this world's best thinkers, and he was in some ways in need of protection and help. He could of course look after himself far more effectively than Phocus imagined but the mission would certainly benefit from this young man's assistance.

Phocus found himself being subconsciously persuaded to cut short his measurement work in order to introduce his master to this god.

He was at first reluctant to leave with his project uncompleted but when he started to think about the measurements, he realised he had actually worked out a way to help his master.

"The square on the hypotenuse will be equal to the sum of the squares of the other two sides" he thought. He had no idea where this thought had come from, whether or not it was really the answer his master was seeking, or what "the square on the hypotenuse" really meant. Pure gibberish if it were not for the odd feeling that the Bird God had influenced his thoughts. But Bird God was in trouble and the Controller wasted no time in passing his thoughts down from on high.

"You are supposed to be delaying and confusing any scientific advances in navigation and astronomy, not helping them, you feathered fool." Little Stalk nodded his crested head in agreement, whilst careful to keep out of range of the Controller's foot. Maybe he could be sent down to sort things out? He would just love to be a god too.
"And you, you nodding idiot, switch yourself into standby mode and stop thinking!" The Controller was clearly not pleased with either of the robot forms the replicator units had produced.
"But surely any intelligence that could build these gigantic pyramid shapes knows such an elementary geometric theorem?" Bird God was mystified. Then he realised that Phocus really had no knowledge of this simple method of obtaining the length of the third side of a right-angled triangle, if one knew the length of the other two. *"Oh well, not much danger of this primitive species launching itself into space"* he thought very quietly and very very rapidly. But these massive pyramids worried him.

Phocus scribbled a few notes on a piece of papyrus reed paper and was suddenly no longer reluctant to depart. This his master must read.

It took the odd pair nearly a month to travel up through the great River Nile delta to the sea, Bird God continually attracting attention by hopping along on his one oversize foot or, when the mood took him, zooming along at head height. The residents of the Nile delta were familiar with the sight of large flocks of migrating storks, always heading south in the autumn and north in the spring. But this individual was very different and left anyone who happened to meet

the pair, feeling that his or her brain had been drained of information.

Meanwhile the Controller had placed the spacecraft in a higher polar orbit, which meant that the tiny ball no longer had to hover high above Bird God. It now completed one orbit every 90 minutes while the planet turned slowly beneath it. It also meant that wherever on the surface Bird God happened to be, the Controller would be overhead at least once every 24 hours. Putting the spacecraft into a proper orbit also solved another problem. Now there was no fear of Bird God forgetting himself and transmitting at normal speed with a risk of being picked up by Phocus.

He and the Controller would have to conduct their thought transfers at high speed because the spacecraft only remained within range for a few minutes. As a bonus this also meant that Little Stalk would remain unthinking for at least 80 minutes at a stretch.

Phocus took the Bird God straight to his master's lodgings at the coastal port and made the formal introductions. "Master, this is my friend who I met near the pyramids. He is not exactly what he seems to be, in fact I think he is really some kind of god." Pythagoras looked closely at the odd bird, then at Phocus.

"Too much sun young man; why is it looking so rumpled and where is its other foot?"

"I never had another one to start with and who are you to make comments when you have that black straggly stuff all over your head and down your back?" thought Bird God just as another disturbing picture appeared on his internal imaging software.

For a moment Bird God thought he was suffering from double-vision again but he realised something else was wrong now. One minute here was another two-legged human with long black hair, and the next a one-legged bird version. But this one-legged bird image was different; the foot had a sandal on the bottom of it, the head had ears and hair but the human's clothing was missing and his arms and hands appeared as wings. In fact it seemed to be a half human and half Bird God. He shook his head and the proper image of Pythagoras returned. Bird God filed the peculiar image on a hard drive; yet another replicator fault for the Controller to fix.

Pythagoras realised that the peculiar bird had not actually said anything and being even quicker on the uptake than his assistant, rapidly changed his opinion of this apparition.

But business first. “What of the mathematical measurements I sent you to obtain at vast expense Phocus. Where are they?” Phocus dug the scrap of papyrus out of his pocket and silently passed it over.

The master read it slowly, and sat down heavily as his eyes took on the glazed look of a nutty professor. He was silent for nearly 10 minutes but Bird God read his every thought.

He had taken an instant dislike to Pythagoras and now he realised that the very primitive and basic theorem he had carelessly presented to Phocus was about to be stolen and claimed as a wonderful new discovery by this hairy-headed thief.

Bird God was on the point of thinking some rather nasty thoughts but something stopped him. He would remain thought absent for the moment.

Pythagoras was only on a short visit to North Africa and now he had a new geometric theorem he was anxious to return to Miletus, the large city on the far eastern coast of the great sea. This would shake his rivals, especially that old fool Thales, who was so ignorant he insisted the Earth was flat.

"A Flat Earth?" Bird God thought to Phocus later. *"Of course it is flat, but my Master has this odd idea that it just might be round. He has no proof, but he seems to spend a long time scratching his head and peering up at the stars. Mind you, he does have rather a lot of odd ideas."*

So the three of them boarded a trading vessel and headed north-east out into the vast Mediterranean Sea.

Bird God avoided downloading his latest report to the spacecraft; he could always claim that being wrapped round a mast hindered reception. Basking in his god-like status he had forgotten to find out why there were no doors in those pyramids or who the builders were. He could hardly ask Phocus or Pythagoras now both were convinced he knew everything.

2

550BC to 548BC

Bird God soon discovered that Pythagoras was a highly intelligent man, although the ship's captain paid him little attention. The vast Greek Empire seemed to rate scholarly intelligence low on its scale of virtues. The strength of one's sword arm, or courageous feats, or even a good singing voice were all admired attributes and seekers of truth were a nuisance. This suited the robot bird's mission but he was puzzled.

Pythagoras was clearly a non-conformist. About the only food he would eat were beans and he would only clothe himself in animal skins. BG as he now thought himself (the Great White Bird God title having been automatically compacted by his software without so much as a by your leave) knew something else about the long-haired rather smelly little man.

Pythagoras believed that when he died his soul would neatly hop into another human just as he, or possibly she was being born. He would in a way, live for ever. *"About as daft an idea as our Secretary General's everlasting life machine"* thought BG, not knowing the Secretary General was no more and the remains of his machine were embedded in an asteroid. Not knowing either, that the Boffin had already succeeded in achieving something very similar.

Then the ship ran into one of the all too frequent sea storms and BG had to wrap his wings even more firmly round the base of the mast to stay upright; that or use up valuable thruster power. Balancing on an only foot on board a boat in even calm conditions was not easy.

BG was not exactly pleased to find himself on board a small wooden contraption pitching up and down on, but more often in, a large amount of liquid. On the other hand he was pleased to discover the captain had no way of navigating properly. The helmsman seemed to steer by the Earth's sun when he could see it and used the other stars at night. But as he had no charts or time piece or even a compass, this meant that the boat tended to wander and it was quite obvious that a safe arrival anywhere was going to rely on chance as much as on skill. No wonder Pythagoras hoped his soul would live forever.

After the storm had abated, the captain admitted to being lost. The only person on board who could have known where they were, was of course BG, who, with the aid of his spacecraft link, would have known to the nearest inch. But BG preferred to remain out of contact; no one had a map anyway. So he kept his thoughts to himself and made preparations for instant lift-off in the event of a capsize or sharp contact with a hard piece of land; a very real prospect because small islands dotted the horizon. He still clung to the mast.

Yet somehow it was Pythagoras who knew how to get the boat on course and that night the captain and BG learned something new. The captain learned some navigation skills from Pythagoras and BG discovered a basic human weakness.

Pythagoras explained that they could steer in the correct, north-easterly direction by using a certain pattern of stars which always pointed to the north. This was news to the captain, who had never been able to work out how they pointed north when this pattern seemed to be moving round in a circle. But Pythagoras explained how to allow for this and gave the others to believe that this was a new discovery of his. The captain was impressed but would have been less so had he known that it had been Pythagoras's even hairier colleague Thales who had claimed the discovery. But BG, who could read Pythagoras like an open manuscript, knew that even this Thales character had "borrowed" this navigational discovery from someone else.
"What a dishonest bunch" thought BG very quietly during a violent roll.

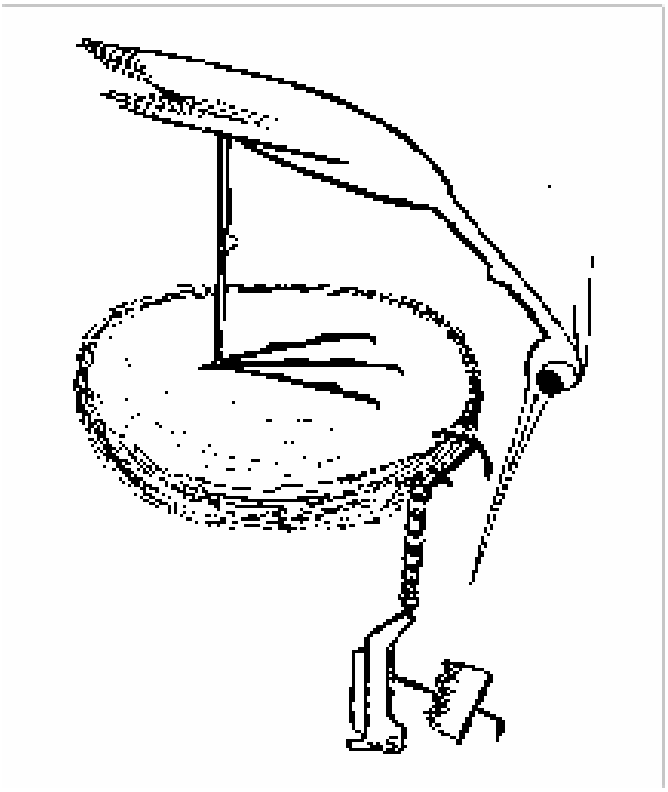
Having reset the course, all that now remained was to find out when to stop, or at least slow down at night so as not to run into the land they were seeking.

BG also discovered that the entire crew were in a constant state of fear at night or during bad weather. So was he, but their fears were different. They expected to fall over the edge of the flat dish at any moment.

BG wisely but grudgingly down-loaded this information to the Controller on the next pass, and even Little Stalk, who had not been programmed to know anything useful, expressed an uncalled-for thought of amazement in the brief instant available to it before being kicked behind the star plotting unit.

"Find out what else these daft humans believe in, then, with luck we might all be able to go home for a few thousand years. There seems little danger of them getting into space while they think they are living on a plate" thought the Controller to BG, careful not to draw attention to the fact that the two replicated robots would be trashed in the recycling bin before setting off for home. *"By the way, why are there no doors in those massive pyramids?"*

"Home of gods," came BG's off-the-wing reply as the spacecraft sped out of range and BG imagined himself standing on a plate.



BG set to work on absorbing the historical details of the flat Earth notion from Pythagoras at once. It would seem that nearly everyone did think they lived on the upper side of a flat dish, which was somehow floating at the very centre of the Universe. Their sun, believed to be only slightly bigger than their pock-marked little moon, rushed across the sky from its rising in the east to its setting in the west once every day. At night it was supposed to go round the underside of the dish ready for the next day.

Their moon, the other planets that they had so far identified (five out of the eight) and all the backdrop of stars, rushed across every night. Above them was heaven where the gods normally lived, and under the flat dish was the heat of hell where the sun went at night. BG made a mental note to encourage Pythagoras to think positively on his belief that the gods lived above them. It would aid his project.

"How big was all this?"
"Huge. Once a lesser god carelessly dropped an anvil from heaven and it took seven days to fall to earth and another seven to fall on through to hell" came the thought reply.

BG had to mask his thoughts to Pythagoras on this point. 14 days from one side of the Universe to the other? He would have loved to have pointed out that the light from his home star took hundreds of Earth years to reach him. He would also have delighted in explaining that the humans "little" sun was in fact over a million times bigger than their "huge" Earth. But although he had somehow been programmed to be something of a show-off, he knew he was answerable to the Controller.

"As for Earth being a flat dish, surely a civilisation that built great pyramids millions of times bigger than themselves, even if they had forgotten to include doors, could have worked out that Earth had a curved surface?" Another dangerous thought, and BG realised too late that this one had slipped out too powerfully.

That night, under a wonderfully clear starry sky, Pythagoras stood with Phocus and the captain on the after-deck. "I've been thinking" announced Pythagoras. BG, still wrapped round the mast, would have groaned aloud had the replicator thought to have provided him with a proper voice.

"As we have been travelling north, new stars are appearing almost nightly low on the northern horizon and familiar ones are disappearing on the southern horizon. This must mean we are moving across a curved surface. If the Earth was flat, all the stars would be equally visible, wherever we were."

Neither the captain nor Phocus could take this in. There seemed just too many niggling little doubts, none of which they could put into words. It was up to BG to try to correct his own thinking mistake that could well have given the game away.

"If the Earth is curved, the water would surely slide off and soon there would be none left" he thought suddenly. He wondered briefly how he had produced such a good argument. The captain loudly voiced these thoughts very sarcastically and Pythagoras decided to leave well alone. He already had many enemies in Miletus, some of whom took exception to his use of logical argument and others who were jealous of his talents. Even Thales would probably be pleased if he were silenced.

Two days later a mountain peak to the north began to emerge from the horizon and Pythagoras excitedly identified it as the island of Samos, his birthplace.

This time BG was successful in suppressing his thoughts so as to prevent the others realising the event they were witnessing surely proved their planet was not flat. Although he would have liked to have gone ashore he was, in the circumstances, relieved when the captain ordered a hasty change of heading to south-east as they were well to the north of their intended position.

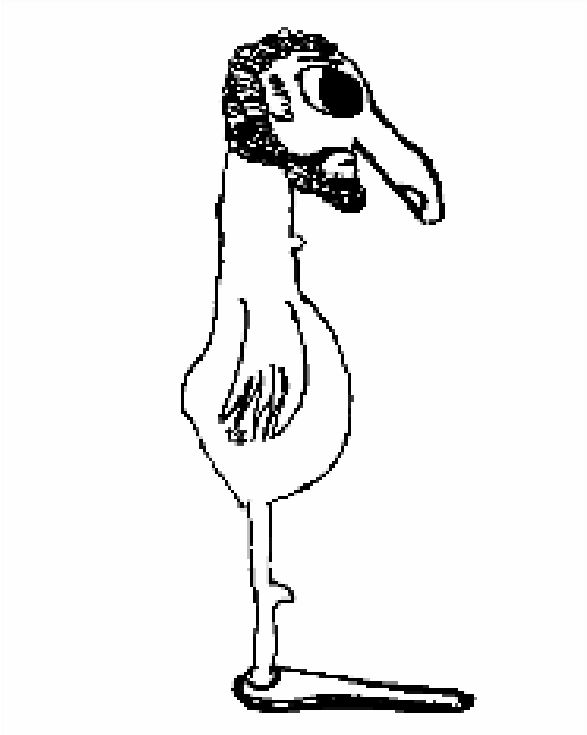
Early the following morning they tied up alongside the jetty in the bay below the great Byzantine city of Miletus. Pythagoras and apprentice, with BG hopping along at the rear, made straight for the house where Thales lived.

After the introductions came a complicated discussion as to who or what BG actually was. All three eventually agreed he was some kind of god who should be given every consideration and their protection.

BG was not happy with this arrangement having already detected undercurrents of thoughts which suggested that both the scientists had every intention of exploiting his god-like status for their own advantage. BG thought insisted that Phocus remain his sole guardian.

Pythagoras, ever boastful, outlined "his" new theorem and gave a practical demonstration which involved measuring the height of Thales's house and a lot of scribbling on bits of papyrus. There seemed to be differences of opinion as to whether or not this really was a new idea, whether it actually worked or even if it had any practical use.

That night, Thales, who's hair was, unlike that of Pythagoras, neat and curly, took them outside to demonstrate his new star angle-measuring device. Going out into the darkness upset BG's imaging system and Thales was transformed into another of those part BG part human visions. BG concentrated hard and the erroneous image disappeared.



Thales was claiming that his new measuring instrument would be of practical help in mapping the heavens and in charting the movements of the six "wanderers". *"Six?"* thought BG very quietly to himself, *"I understood they had only discovered five of their other planets."*

"Six?" said Pythagoras scornfully to Thales, "don't tell me you still believe the morning star is a different one to the evening star? I proved to you last year they are one and the same. Venus at different seasons, that's all. Even Phocus knows this."

"Rubbish, you proved nothing, a mere assumption, just as ridiculous as this claim you are now making that the Earth is round. You know nothing of astronomy. Don't forget it was I who forecast the eclipse of the Sun that stopped the war between our neighbours, not you, you bean-eating idiot." Thales was exaggerating again.

It was true that in the seventh year of the recent war the day had turned into night, the birds had sensibly stopped singing and all the warriors had been frightened out of what few wits they possessed. By then both sides were looking for an excuse to stop anyway, so they had agreed the eclipse was an act of Mars the God of War, (who happened to be the brother of Venus) telling them to call a truce. Only after the event had Thales revealed his prediction.

Before Pythagoras had time to point this out, Thales stumped angrily off into the night. A few moments later they heard a crash followed by a splashing sound and a cry for help. He had fallen down a well and it took some time to get him out. Had it not been for the unusual strength of BG he probably would have drowned, but the robot bird needed the closed mind of Thales to help him counter the dangerously advanced ideas of Pythagoras.

The ungrateful sea captain had already assisted BG's assignment by reporting Pythagoras to the authorities and the very next day the hairy little man was summoned before the city elders to explain why he was publicly defying the gods. Instead of apologising meekly, or even bothering smarten his appearance, he straight away tried to convince them that the Earth really was curved, not flat, even going so far as to suggest that it was actually a perfect sphere. So they threw him in jail for an indefinite period. They also, with the help of a few thoughts from BG, decided to burn all his notes.

Having dealt with the Pythagoras problem, the mission now had to discover if there were any other forward-thinking people who needed to be silenced.

The Controller had already checked for dangerous thoughts over the rest of the globe during the thousands of orbits. But owing to the numbers of jumbled thoughts being received from almost everywhere bar either polar region, it could not be absolutely certain.

There were no other areas with such advanced structures, and as these Greeks had already travelled widely, the chances were that individuals like Pythagoras and Thales represented the top layer of the intelligence pile.

In any case the Controller knew it had to return home to report and both replicators needed checking by a real expert. BG was given instructions to act as an independent field agent, to stick close to Phocus and to carry on the good work without using too much thrusters power. The space-craft would be back within 3 Earth years or so.

But it was not to be. Little Stalk was fed into the trash bin, all the external bits and pieces were withdrawn and the home sun was locked into the long-range version of the automatic star plotter. Everything was then compacted, including the Controller and the golf ball of a spacecraft flashed off on its return journey to base.

Ten months later it came to a screaming halt, reverse thrusters on full power as it narrowly avoided being sucked straight into its home sun by the massive gravitational pull of that huge star.

When the Controller was automatically reconstituted it realised from the computer read-out just how close the mission had come to disaster. The long-range automatic star plotter had been alarmingly accurate.

But after turning the little spacecraft back into something again resembling an untidy line of washing hanging out to dry, the Controller was alarmed to discover its home planet was not in the place predicted by the spacecraft's super-efficient navigating system.

Perhaps it had arrived at the wrong solar system, but no, it was in the right place. The other planets were still in the predicted positions. Then the Controller located a large object in a place where no large object had been when it left. It then wasted the next six months travelling to the home planet's predicted position, during which time the spacecraft experienced several near misses with unregistered space debris and actually had one of its gadgets slightly damaged.

There was no sign of the home planet when the spacecraft did arrive. Any fool could have told the Controller that from 50 million miles away, but the robot had to follow the pre-programmed instructions and its reasoning was merely logical. Perhaps the detection gear was faulty or maybe the scientists had invented an invisible shield in its absence?

Unfortunately the Boffin had not written any software into the spacecraft's programme to allow for their planet being smashed into by an asteroid. The robot Controller was now on its own. It buzzed the craft all over its solar system, visiting every planet and moon, checking to see if everyone had moved house.

Finally nearly two years later, it at last checked out the large unidentified object. From a distance some of its surface matched the computer contours of the home planet, so the Controller took the craft in for a closer look. As it put it into a low orbit the spacecraft went out of control. The object was not round, it was "D" shaped and its gravity was fluctuating and upsetting the spacecraft's orbit. The Controller hastily prepared for an emergency landing and managed to retract the gadgets and deploy the braking system before landing with a bump somewhere in the middle of a huge flat area almost half the size of the planet.

Now what? The Controller fed some data into its computer and discovered that the fluctuating gravity was being caused by extra dense areas. This would almost certainly be due to an asteroid or parts of one being buried deep beneath the surface. That would explain this huge flat area. Its home planet had received a direct hit from a massive asteroid and now at least one third of it was missing and the remains had taken up a new orbit. There was also no one at home.

Its last thought before it set about a major refurbishing operation, which was to take much longer than planned, was that if Pythagoras was with it now, he really would be able to move vast distances across the flat surface of a planet.

3

548BC to 250BC

While the spacecraft was travelling billions upon billions of miles on an entirely wasted journey, BG had been busy.

The brain of Phocus had been drained of information and BG was satisfied Pythagoras had been at the leading edge of discoveries in the navigation and astronomy fields. In his estimation, this species represented no threat to the mission for thousands of years. So he decided to do a bit of travelling, to see the world, while he waited for the spacecraft's return.

But he was reluctant to leave his "guardian". The man might prove useful if there was a sudden spurt of discovery somewhere. However he faced a problem; these humans had a very short life span and Phocus was likely to die long before the next major discovery required sabotaging.

So Phocus's brain was accessed once more and this problem was put to him in such a way that he thought it was his own concern.

"I'm worried about you BG. We should set up house near Athens on the mainland of Greece where most of the scientific action is nowadays. The sort of place where we can encourage students to gather to discuss the latest discoveries and to consult you. Everyone will be thrilled to be in the company of a real god."

BG really had nothing to add but wondered why he had not thought of the idea himself. *"Oh you would have if you had known about Athens"* thought Phocus who luckily for BG and the mission had not realised that BG had an entirely different reason for meeting this planet's top brains.

So Bird God and the rapidly ageing Phocus established their seat of learning in Athens and before long BG had acquired the reputation of a top rate soothsayer, an oracle to rival the one set up at nearby Delphi. But BG was careful not to step on the toes of others making god-like claims, even though he realised they were tricksters. No advance predictions of fame or storm warnings from him. Only subjects based on scientific logic were thought about.

BG set up regular question and answer sessions at which the leading scientists asked his advice and he gave misleading answers whenever this would aid the mission. This went on for years and years and then Phocus died. But the oracle had become so famous that BG found he could cope without further introductions.

But still no spacecraft and now BG began to wonder if anyone was coming back for him. In the not too distant future his feathers were going to require a service and he would run out of fuel.

But help was at hand. Having completed the essential renovations on the new flat plain of the home planet and confirmed that no one was home, the Controller had locked back on to the sun in the distant solar system where it had left BG, pushed the right buttons and set about travelling back across hundreds of light years worth of distance.

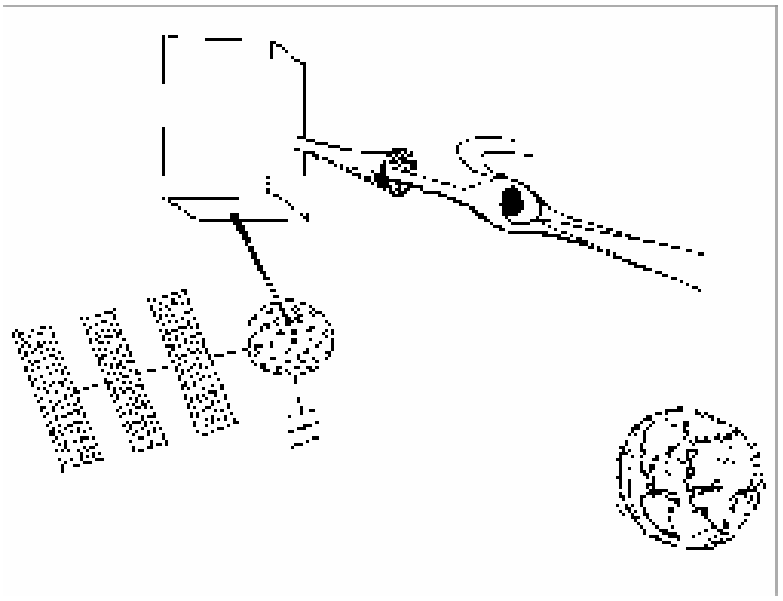
The journey should have taken 10 months as before, but the tiny spacecraft was in transit for more that 10 years and emerged near a sun at the very edge of the Galaxy having missed the right one by a rather long way. One of the navigation computers revealed that because of the new variable gravity on what was left of the home planet, the dark tunnel had been slightly misaligned at lift off.

This error meant that the Controller took considerably longer than expected to arrive back at Earth.

“Yes, the spacecraft is back, yes the replicator has been repaired but no it has not revived Little Stalk yet. No it has not brought fresh instructions owing to the fact that the home planet is now D shaped.”

BG gathered the Controller was not in a good mood so he refrained from thinking him why it was D shaped or what had taken him so long.

BG took a day off from his oracle centre and arrived outside the spacecraft in a scruffy condition, one large bleary eye peering in at the Controller. The Controller reacted by operating the recycling grab with undue haste, not wishing to have this weird apparition knock into anything delicate and BG was sucked backwards into the external replicating unit.



The replicator ejected a renovated BG unceremoniously into space almost as hastily as the Controller had stuffed him into the machine in the first place. Again BG did his party trick of flapping close alongside and again he placed one huge eye up against a viewing port and peered in.

But something was wrong. BG instinctively felt it, and the Controller, after one hasty glance, knew it. BG had been renovated all right. His feathers were absolutely magnificent although not all of them were now white. He had a wonderful pink patch on his breast and two lovely yellow plumes curved back from a head that was somehow fatter. Actually everything about the new BG was fatter.

"Has the new version of Little Stalk got two legs or one?" BG enquired, trying to spot Little Stalk somewhere in the cabin. The Controller was receiving his thoughts loud and clear and detected a strange hint of panic about them.

"Actually I never got round to renovating Little Stalk to find out. I really feel a lot more comfortable without him." The Controller wondered if perhaps it should have followed orders and produced a miniature test model first. This edition of BG certainly did look even odder than the first version.

"Download all your data and then buzz off back to your oracle centre and re-commence oracling."

"What data?" BG thought. *"You were so keen to trash me, you forgot to do the download first. You'll have to recover it from the trash can, I don't have it anymore."* BG departed hastily, forgetting to check on his imaging system and without giving the Controller the chance to discover that he was not being entirely truthful.

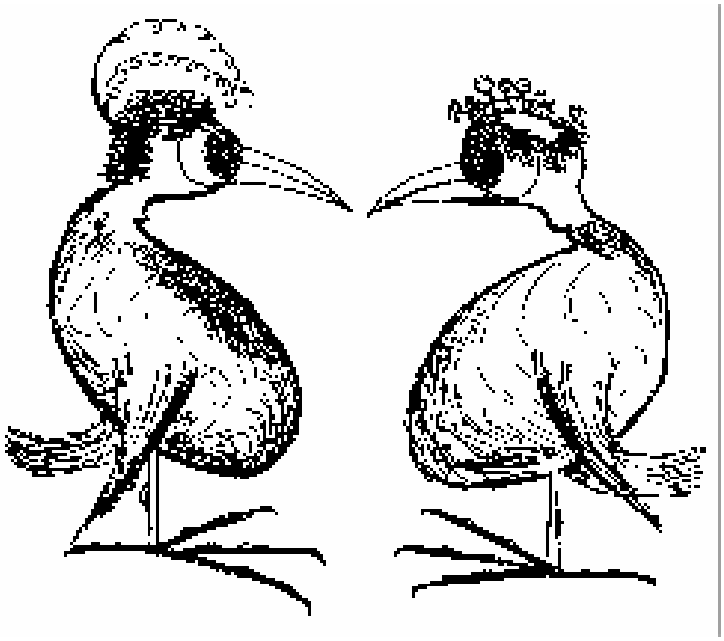
Back in Athens BG was unwilling to delve too deeply into his imaging software in case it was still faulty which would give the Controller an excuse to suck him into the replicator once more. But unfortunately he caught sight of his new image in the polished metal door leading to his inner audience chamber.

At first he thought the metal door had somehow been bent in his brief absence, distorting his reflection. But when he glanced down he noticed that his stomach stuck out so far that he could only just see his feet – no not feet, but foot. He also noticed his foot still had the knobbly bits on the top, but what really caught his attention was his colouring. Despite his misgivings BG, resplendent in his new finery was the talk of Athens. Everyone wanted to consult the renovated god, although no one could actually name the bird he was supposed to represent. But did that matter? Not really, and if the new image served to bring scientists to his notice and advance the aims of the mission, BG would have to accept the fact that he could not see his only foot without the aid of his polished door - or a puddle.

One day two strangers paid BG a visit. *"Oh miraculous one"* thought the thin one (who seemed to have a small tuft of hair growing from his chin as well as covering his head), apparently already familiar with the well known method of communicating with this strange god. *"Your perfectly round eyes, and your rather round shape must be an omen. You are obviously letting me know that you agree with my own perfect spheres ideas."* As an afterthought the tufted-chin man added *"I, Aristotle, have brought a rather ignorant colleague to see you."*

BG glanced behind Aristotle and there stood a spectacular figure. The man was exceedingly fat and dressed in the most outrageous pink robe with a garland of bright yellow flowers stuck firmly on his bald head. This amazing person, so fat he could not see his feet, attempted a slight bending at the waist by way of a greeting without much success and thought *"I am Heraclides of Pontus and I wish to compliment you on your choice of colouring. Very fetching. Take no notice of my skinny friend, he is jealous of our dress sense."*

BG, unusually quick on the uptake for a change, probably because he had just been serviced, merely nodded. This caused his yellow plumes to fall across his eyes, which he closed while he tried to appear all-knowing. This immediately produced a double vision one-legged bird version of, in this case, Heraclides which was so disturbing that BG opened his eyes again rather hurriedly.



But why did Aristotle introduce his man as *"his ignorant colleague?"*

"Well," thought Aristotle, *"He certainly is ignorant and I suppose he is a colleague. We are both astronomers who agree that everything in the Universe consists of perfect spheres but he, silly man, also thinks that the planets Mercury and Venus orbit the Sun."*

BG managed to prevent thinking that Heraclides was absolutely right, but could not prevent a slight nod of approval; a human mannerism he had picked up from Phocus. This caused his plumes to fall over his eyes again and neither man noticed the nod. *"Everything in the Universe consists of perfect spheres?"* he thought very quietly while his data bank searched unsuccessfully for details of one single planet, moon, or asteroid in the entire Galaxy that was in fact a perfect sphere. One quiet thought led to another and BG wondered idly why his home planet was now D shaped.

Aristotle, now speaking to Heraclides as if the oracle was merely a bystander, continued.

"If you agree that all the heavenly bodies move round the central Earth along perfectly circular tracks how can you possibly claim that Mercury and Venus move round the Sun?"

Heraclides gently laid his hand on his garland of flowers while he prepared his answer but BG flicked up his head to toss the plumes out of his line of vision and held up a wing to assert his authority and stop this complicated argument.

"You two are both wrong and I will explain why." BG was, for a robot, becoming surprisingly good at not being entirely honest and the fat man was obviously getting far too close to the truth. Next he would be suggesting that all the planets orbited the Sun.

"You Aristotle know that many men live vast distances from Athens. Greek trading ships have ventured far to the west past the Pillars of Hercules and out into the great wild ocean. Other traders have travelled even further to the east to bring back spices and gold. In all, perhaps half way round this perfect sphere of yours." Aristotle nodded, but knew what was coming next. The same point that had been used to defeat Pythagoras 150 years earlier and the reason why the city elders had eventually let hairy little man out of prison.

"Why do they not fall off, why do they still stand upright if they are living half way round this globe?" BG detected a flicker of doubt in Aristotle's brain activity but he also had to remember to keep Aristotle's dangerously active mind focused on his entirely wrong notion of perfect spheres and perfectly circular orbits on the logical assumption that everyone would sooner or later realise the Earth was indeed not flat.

"But I do agree that the Universe is a perfect place and Earth is at the very centre. Perhaps you could work on this one?" Again Aristotle thought no reply but this time his brain activity read-out became positively active.

BG then turned to Heraclides. *"But you sir, if these two planets move round the Sun and the Sun moves round the Earth every day, why do we see Venus hanging in the same place night after night and then suddenly disappear for weeks on end?"*

BG knew he was again treading a dangerous path. If someone ever worked out that the real reason for this was that Venus was orbiting closer to the massive Sun than Earth was, his mission was in trouble, but he had no choice.

Both the astronomers fell silent somehow sensing they would be unwise to dispute the oracle's logic. They bowed briefly, the fat one to the best of his ability and hastily left BG in peace.

Heraclides was so depressed that he left Athens in a sulk and became a men's fashion designer. Aristotle spent years trying to make all the known movements of the heavenly bodies fit his belief in perfect spheres and perfectly circular orbits. He produced so many drawings and diagrams and notes and collected so many copies of other people's notes and diagrams and drawings that he even had to rent an old warehouse to keep them all in.

Eventually he had to leave Athens in a hurry when his ideas became too unpopular with the city elders, leaving all his data to rot in the warehouse. This conveniently aided BG's task of preventing others from reading Aristotle's ideas on a spherical Earth and put a stop to him discovering anything too useful.

Having probably succeeded in neutralising the dangerous sections of Aristotle's ideas, and completely demoralising Heraclides, who both incidentally managed to die within days of each other, BG found himself with less and less to do. Athens, although a magnificent and spectacular city, was becoming a scientific backwater. The name of Aristarchus of Samos had cropped up more than once recently and this seemed a good excuse to prospect the island BG had previously only viewed from the deck of a ship. This small volcanic island might be a suitable place to re-locate to.

But before he went, BG needed to change his appearance. He was fed up with plumes falling over his eyes and too many visitors were thinking insulting thoughts. He was clearly no longer dressed in the height of fashion and if he arrived out of the blue in Samos looking like an exotic bird, someone would probably try to stick him in a cage.

The Controller, forbidden by its programming ever to land on an inhabited planet on pain of annihilation, had recently taken the spacecraft to the Moon, partly because of an absence of anything to

control on Earth, and partly because the external replicator appeared to need attention although the Controller's software was in conflict on this point. Certainly BG was not going to be pleased if his next refit turned out as badly as his last. But if a robot had been capable of smiling, the Controller would have beamed. The sight of that flapping yellow-crested pink-breasted goggle-eyed BG was firmly etched in the Controller's data bank.

Because even the most powerful thought transfers were liable to break-up over the 240,000 miles that separated Earth from the Moon, the Controller had promised BG that it would resume earthly polar orbits when a particular comet next put in an appearance. The Controller had also impressed on BG the need for the utmost secrecy regarding the arrival of this comet.

"Under no circumstances show off by forecasting the year of its next return. Someone might realise it travels in a non-circular orbit." The Controller did not bother to go into further details regarding non-circular orbits. So the next time this spectacular comet put in an appearance and caused every soothsayer worth knowing to predict either crop failures or floods, and sometimes both, the little spacecraft lifted off from the Moon and resumed its polar orbiting duties.

This time the Controller down-loaded BG's updates and deleted the imaging glitches complaint from BG's data bank before letting him anywhere near the spacecraft. Then it was sufficiently skillful to catch him with the grab again and stuff him in the replicator before BG had the chance to look inside and spot the new version of Little Stalk.

Little Stalk had turned out rather well; except for one minor flaw. Nice shape for a bird, neat plumage, graceful neck and a sensible thick little bill that would not, for once be able to poke its way into important items of equipment and its crest could never hamper its vision. But it still only had one leg and worse still, the entire length of the leg was in the shape of a flat spiral with an overlarge foot stuck on the bottom.

More a coiled spring than a leg to stand on and the Controller had already been subjected to the distracting experience of having to watch Little Stalk springing up and down for hours on end. It hoped the automatic connection linking the internal and external replicators

was where the fault lay but somehow it doubted it.

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BG emerged from the external unit, noted that yet again he had only been provided with one foot and ungratefully shot off in the direction of Samos without so much as a thought “thank you”.

BG circled the island’s little port warily, studying the layout and wondering where to set up his new oracle centre. A small open-sided building in a garden seemed worth investigating and he came in for a landing, aiming to alight on the front steps. As he gracefully touched down, his leg collapsed under his weight and then it sprung up again, flinging him somersaulting back into the air and up on to the roof of the building. A quick burst of an automatic thruster and BG was standing upright and at rest on the very apex of the roof while trying to give every appearance to anyone who might have been watching that this acrobatic landing had been performed deliberately.

Actually a man had been watching who had already heard of an odd - looking bird god who had been holding unspoken question and answer sessions with scientists in Athens for generations. He was not about to discourage this god from visiting him by commenting on his landing technique; he was desperate for an intelligent mind to think to. BG realised at once that he was being made welcome. Over the years he had established a reasonably accurate method of assessing the mood of human first acquaintances by the appearance of their hair whenever thoughts were not immediately available. A sort of poor substitute for the antennae colouring he had been programmed to recognise.

This method did not always work, but the man had neatly cut hair and a trim little beard that together put BG in a cautious but friendly mode. So BG let down very slowly onto the top step of the entrance, this time without even the hint of a rebound.

Within seconds the man had introduced himself as Aristarchus and was thought-discussing his new discovery. He had worked out that the Sun was 20 times further away from the Earth than the Moon was, and as they appeared identical in size in the sky, it stood to reason that the Sun was 20 times bigger than the Moon as well. *“What did the Bird God think about that?”* BG was taken completely by surprise, and not by the apparent coincidence of arriving in exactly the right place; no doubt the Controller was responsible for that.

No, the measurements Aristarchus had provided were completely wrong, but the clever method this man had used to arrive at the answer was logical.

"Oh my" was all BG could think by way of reply, which Aristarchus took to be a thought of approval and moved to shake BG's wing in delight. But he stopped himself just in time. He knew better than to make physical contact with a god.

Thinking he may have offended him, Aristarchus walked up the steps and into the house, motioning for BG to take up residence. BG was in for a surprise.

"Please do not leave the shelter of this house. The wife and sister of Zeus, the God of all Gods was born here on Samos and everyone worships at her sanctuary and the offspring of her peacock birds are sacred. No one will welcome a newcomer Bird God, especially one with a single deformed leg."

BG reported the encounter to the spacecraft on the next pass and asked for instructions. This was doubly serious and both BG and the Controller realised there was sure to be more bad news to follow.

"Just think dumb until you can collect all this man's data, then we will work out how to discredit him. Meanwhile do as he thinks and stay out of sight, but be ready for a speedy departure."

The Controller refrained from mentioning that, according to his data bank, peacocks were considered to be the height of fashion and that BG's landing antics were clearly the action of a very dumb robot who should have no trouble staying dumb. No point in sending BG into a sulky "Heraclides" mood.

When Aristarchus returned the next day he did indeed bring more bad news. *"I have spent years examining the writings of Aristotle housed in the Great Library at Alexandria and many of his conclusions were wrong! A great man, but if only he could have dismissed his belief that the Earth is at the centre of the Universe."*

Although BG managed to remain thought-absent he failed to prevent a slight nod and with no plumes to hide his mistake, seriously contemplated blasting off there and then so as not to give anything else away.

The Controller was not going to be pleased with his efforts at acting dumb although it was not really his fault. Confronted with two unexpected revelations without prior warning, BG had been unable to prevent that tiny human-like nod of agreement.

The Controller really should have thought him about Aristarchus's ideas and the fact that Aristotle's papers had survived after all. It should have trashed Little Stalk instead of wasting communication time trying to prevent the pest from springing all over the control room

But Aristarchus had not finished. *"The Sun is obviously at the centre of the Universe, not the Earth. The Moon travels round the Earth once a month and the Earth plus its Moon and all the other planets go round the Sun and the background of stars do not go anywhere. Some are very distant. The Sun and stars only seem to go round the Earth every day because the Earth is spinning once every 24 hours."*

As soon as Aristarchus had left him, BG reported to the Controller in an emergency burst of thought and within seconds BG's main computer received the following very fast flash of updates.

"As Aristarchus believes that the Earth orbits the Sun he must also have realised that the Earth's orbit is not circular because the length of the winter season is not identical to the length of the summer season."

BG at last understood the Controller's previous warning about forecasting the comet's return. Orbits of all bodies in the Universe are always non-circular and without understanding this and, more to the point why this is so, no creature could enter the space age. Prior to the arrival of Aristarchus no human had even considered that the Earth turned on its axis once every 24 hours and took a year to travel round a central star, let alone doing so along a non-circular path.

"You should have warned me, I bet you knew about this. What do you expect me to do about it?" BG thought rather powerfully when next in contact with the spacecraft.

"Discredit this man just like we did with Pythagoras, Aristotle and Heraclides. Should be no problem for a bouncy bird."

BG thought about this for a long time. The spacecraft had completed dozens of orbits and still BG had no answer.

At least he realised he could not continually rely on city elders to do his discrediting work for him especially now that he was in competition with a flock of peacocks. In any case sooner or later the politicians would wake up to the fact that scientists like Aristarchus could make them money and would give them power. Then they would begin to rely on them instead of trying to poison them. Just as had happened back on the home planet.

BG switched into standby mode again and when Aristarchus visited him the following day he could not make thought contact. The Bird God was probably hibernating like the Swallows that dived to the bottom of ponds every autumn and only emerged again in the warmth of the spring, but this god not wishing to get wet, was simply asleep standing up.

It was many weeks before BG came alive again and realised with a start that sometime during his standby mode, he had been supplied with the answer. What was the Controller playing at?

On the next warm day Aristarchus called on the off-chance that BG had completed his hibernation and immediately began receiving powerful thoughts although BG eyes remained closed.

"If the Earth is turning once a day as you claim, it must be travelling faster than the swiftest chariot. Where is the wind that this would create?" Without giving Aristarchus a chance to reply, BG continued *"And that wind would always be blowing very strongly from the east; which is not the case."*

Somehow everyone was soon pointing out the snag in the Aristarchus spinning Earth theory and some were openly laughing at him or even blowing furiously in his direction whenever he visited the market place.

If he had possessed any real feelings BG would have felt sorry for that remarkable man of vision. So near to taking that giant leap directly from a central stationary Earth to a real understanding of the makeup of his solar system, and yet the rest of mankind was easily persuaded that Aristarchus was a rather dangerous idiot. A close call for the mission.

4
250BC to 44BC

So at least a few of Aristotle's papers had not after all lain unread and forgotten in that old Athenian warehouse. Did the surviving documents constitute threats to the mission? The great sea port of Alexandria and Aristotle's surviving manuscripts were calling BG south across the sea from Samos. How he knew exactly where to go next and that there was no need to change his appearance despite the handicap of his springy leg remained a mystery to him. The Controller was clearly only thinking him on a "need to know" basis.

In order to show off his independence, BG decided to dash across at low level during the night, looping round each of the numerous islands in his path like a fast-flying avian adventurer. Doubtless the Controller would complain about the waste of fuel when next he reported in but so what?

As with his landing at Samos, he automatically headed for a building surrounded by a large garden, but this time the building was a massive stone structure. He landed carefully on one end of the flat roof and as the bouncing subsided, settled down to await daylight and developments.

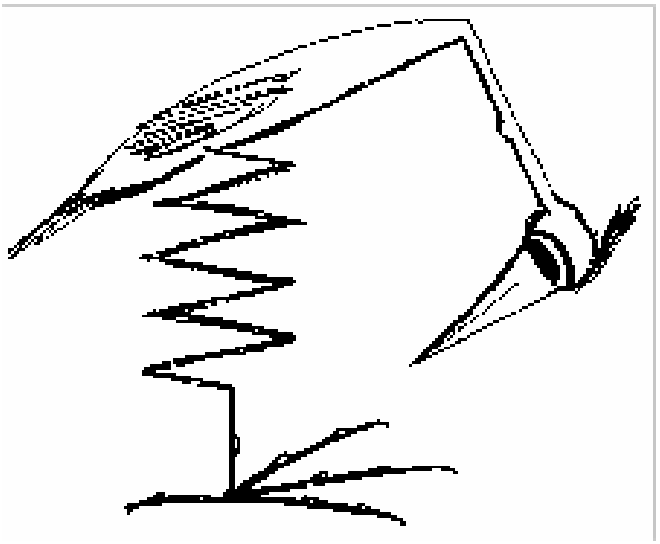
BG waited until mid-morning before he suddenly detected thoughts coming from inside the building; someone was reading a complicated document to himself. BG soon realised the author of the document was the long dead Aristotle. This must be the Great Library, but who was the reader? For a long time BG simply thought in before deciding the time was right to implant a few of his own.

The reader's thoughts stopped abruptly and a long-haired youth trotted out of the building, turned to look up at the roof and bowed so low in BG's direction that his hair touched the ground.

"You must be the Great Bird God everyone is talking about" he thought. *"Could you show me how you spring up and down on your leg?"* Although BG was not amused he at least had to acknowledge that this lad was quick on the uptake. He had not uttered a single word – nothing but thoughts.

"So who are you and why should I jump up and down to please you?"

"My name is Archimedes and I was born on an island far to the west. My father is an astronomer and he sent me here to study. I am trying to understand the teachings of Aristotle but it is not easy."



BG passed a stream of misinformation across and the youth beamed happily while BG bounced gently on his springy foot. As he bounced, a vision of the machinery used for lifting the dusty uranium ore up into the delivery pods on that distant mining asteroid suddenly arrived in his memory data bank. Instead of using the usual conveyor belt they used a tube with an internal spiral just like the flat spring of a leg he was bouncing on. The spiral pulled the ore up the tube as it turned. This prevented dangerous dust from drifting everywhere.

Archimedes stared at BG's leg as if hypnotised and then suddenly he snapped back into life, excused himself with another low bow and rushed off down the garden path.

A week later Archimedes had constructed a screw water-lifting device of his own and had proudly demonstrated it to BG. Archimedes put the lower end into the garden fishpond and turned the handle at the top. After five or six turns water started to flow out of the top opening. BG could not understand the obvious delight shown by Archimedes until he remembered seeing all those people struggling to water their fields alongside the great river Nile. They carried the water in little wooden buckets. What a job, but now...

And that is how the Archimedes screw was invented and how Archimedes became famous and why everyone believed him when he explained that Aristotle was right in all the bits which were wrong and wrong in all the bits which were nearly right.

BG managed to further divert Archimedes by encouraging him to estimate the number of grains of sand in the Universe. Archimedes was never entirely successful in this, possibly because the largest number the Greeks understood was a “myriad” which was only 10,000. Had BG been permitted to explain there were many billions of other suns in this Galaxy alone and there were several more billions of Galaxies out there somewhere, Archimedes would probably have stopped counting. But at least it diverted him from discovering anything useful in the astronomy or navigation fields of science.

Because of his invention of the water-lifting screw, every army commander wanted Archimedes to invent weapons of destruction for them and he soon left Alexandria in order to make his fortune. But without BG, Archimedes found himself unable to invent anything nearly as good as his lifting screw. At the great battle of Syracuse on the island of Sicily where he had been born, he was killed by mistake by the victorious Roman soldiers. This despite the general having given orders for his life to be spared so that Archimedes could invent something for the Romans. So the general took the jewelled mechanical version of Archimedes’s Universe instead. This showed a stationary Earth at the centre with all the planets, the sun and the stars moving round it just as Aristotle had erroneously written.

BG felt he really had achieved something at last. He had managed to turn the replicator’s latest production to advantage and this gave him an idea for the future. He also realised that the two latest bird versions had conveniently enabled him to complete stages of his mission.

Maybe the replicator was not defective at all. Perhaps it had been deliberately programmed to produce these odd bird designs? If so, what type of bird was the replicator going to convert him into when he next visited the spacecraft? He most certainly needed to get rid of his inconvenient springy leg. But his batteries were in need of a solar recharge after all the low-level zooming about and thought exchanges with Archimedes, so he sprung back onto the roof of the Great

Library and switched into standby top-up mode to await the Controller's next contact.

This was a mistake because during this interlude, the scrolls of the now dead Aristarchus were also deposited in the library beneath his perch. Then another astronomer by the name of Apollonius visited the library, read all the scrolls he could lay his hands on, made many notes and left again to establish a library of his own, even taking some of the Aristarchus manuscripts with him.

The Controller somehow seemed to collect thoughts from Earth much more efficiently then BG; most of the time. Apparently although BG had originally been successful in convincing everyone that the Earth really was flat, too many undeniable and rather obvious facts had now convinced most scientists that it was shaped like a grape as Pythagoras had always claimed.

On the next pass of what was now being called the Great Comet, BG came to life and shot off from the library roof to pay another visit to the Controller, who once again roughly pushed a somewhat faded BG headfirst into the replicator the moment it could activate the grab.

But on emerging refurbished and updated, BG merely placed one large eye against a port, winked cheekily at the new version of Little Stalk half hidden behind the Controller and buzzed off down to Alexandria again without so much as a single sarcastic thought. The Controller, with encouragement from Little Stalk, took offence at this brush-off and went straight back to the Moon determined to stay there for at least two consecutive appearances of the Great Comet to teach BG a lesson.

The moment he touched down on the now familiar roof of the Great Library without so much as a single bounce, BG knew he had undergone a change for the better. After a careful examination, BG hopped around a while on his new powerful but feathery leg, then tucked his wickedly sharp curved bill into the purple feathers of his chest, closed his large yellow eyes and contemplated.

It was not long before news of the one-legged Bird God's return reached the ears of the new head librarian who at once decided he wished to consult the latest version of the famous oracle. The old version had been asleep for as long as anyone could remember.

Unfortunately, being no respecter of gods, he climbed on the roof and tried to wake BG up by tapping repeatedly on his beak. This had absolutely no effect but the moment Eratosthenes - for that was the new librarian's peculiar name - began to think about why he wished to consult this new version of the oracle, BG suddenly opened both eyes, flexed his leg, puffed out his chest and thought *"Bang me on my beak again and I might be forced to give you a mild zap. What do you want?"*

Eratosthenes, clearly unafraid of BG simply thought *"Aristotle, who, I believe long ago consulted you, has written that the Earth is a sphere and even estimated its circumference, but I think his dimensions may be in error".*

Not wishing to give anything away and a little upset that his reputation as a fearsome god might have been eroded, BG rather than answer thought *"How would* you *measure the Earth's circumference?"* Unfortunately this ploy of passing the buck so favoured by politicians on his home planet did not deter Eratosthenes.

" I have heard that the Sun shines directly down the well at the township of Syene far to the south once every year on midsummer day at noon. If I could measure the angle of the Sun here on the same day and knew the distance between the two places I could determine the Earth's polar circumference. What do you think Bird God?"

BG, who feared his data bank might not quite be up to the task, played for time.

"I must consider if your request is worthy. You can construct a shelter for me meanwhile."

BG really should consult the Controller, but after the last refurbishment he had left the spacecraft in such a hurry he had forgotten to ask where the Controller was going next. All he knew for sure was that the spacecraft was not in an Earth orbit. He was on his own on this one and the Egyptian climate had ruined his coating all too quickly last time.

By the time his shelter had been completed BG was ready and on his next visit, Eratosthenes, received his answer.

"Your idea is sound, but hurry, midsummer is only a week away."

BG's data bank told him the town of Syene was not directly south of Alexandria (was not on the same meridian) and BG also knew Eratosthenes could not possibly measure the straight-line distance between the two places anyway. He also knew that the Sun was not exactly directly overhead at midsummer at Syene and the librarian would not be able to measure the corresponding height of the Sun precisely at Alexandria either. Four possibilities for error would surely produce an incorrect answer.

Under the watchful eye of BG, Eratosthenes carefully measured the length of the Sun's shadow against the wall of the library, using the basic Pythagorean right-angled triangle method and concluded the angular distance between Alexandria and Syene would be 7 1/5 th. of a degree (1/50 th. of the 360 degrees) of polar circumference of the Earth. His tax collector contacts told him Syene was 5,000 stades south of Alexandria so he simply multiplied the 50 by 5,000, making the polar circumference of the Earth exactly 50,000 stades, a stade being the length of an open-air stadium used for chariot racing. However Eratosthenes was a map-maker, which is why he was trying to measure the Earth; he wished to slice it into horizontal hoops, each hoop representing one degree of latitude. But one cannot easily divide 50,000 stades by 360 degrees, so he added another 2,000 stades, making a total of 252,000, which can easily be divided by 360; 700. So each hoop of latitude on his maps would be 700 stades apart.

When BG read the thoughts of Eratosthenes whilst the librarian was sketching his first map of North Africa he was appalled. All the librarian's mistakes had cancelled each other out. The man's final result was within 1% of the correct answer! Fortunately for both BG and the mission this merely proved to everyone that the Earth was gigantic. So huge that it must certainly be at the very centre of the Universe!

Over the years, in between bouts of standby mode, BG continued to be consulted by many that visited the Great Library. At every opportunity he accessed their thoughts and added these to his data bank.

50 years after the death of Eratosthenes, one visitor gave BG cause for concern; the man's name was Hipparchus who, BG already knew, was busy working on improvements to Eratosthenes's maps by adding the upright lines of longitude. Of more concern to the mission, he was also busy drawing up names of stars and mapping their patterns and positions in the night sky.

One day he paid the oracle a visit. Looking up at the purple bird in his little temple on the roof, the middle-aged astronomer rather proudly thought *"I have just estimated that the length of a year, the time from one equinox to the next, is 365 days plus a quarter of a day minus nearly one part in 300."*

BG was so astonished that he could not stop himself thinking *"how did you manage to time an Earth year to within six and a half minutes, which is 99.999% accurate, with only a water clock?"*

He switched himself very rapidly into standby mode but far too late. Hipparchus scratched his beard and seemed puzzled. How did the oracle know his estimate was not quite correct and what exactly did "99.999% accurate" mean?

When Hipparchus had left, BG accessed his data banks and discovered the astronomer must have checked ancient records for dates of eclipses and suchlike going back for the past 304 years. Clearly Hipparchus's star mapping and his mass of discoveries were dangerous; his documents in the Great Library must somehow be got rid of.

BG remained unmoving and undisturbed for nearly two weeks. This problem of the elimination of the library records was not going to be solved easily. He could not just zoom in and set the place on fire; this would ruin his hard-won reputation as an oracle. Men of learning would not consult an arsonist.

After emerging from his apparent trance, BG made no move to do anything to solve his Hipparchus problem. He had to wait for exactly the right moment and as long as no further unfortunate discoveries were made, he could afford to be patient.

And he waited and waited and waited. Following the death of Hipparchus, many men of learning came to visit BG over the next century and were secretly drained of information but all failed to make real "thought" contact. All received the strong impression that this colourful regal figure was waiting for a visit from a world leader and only then would the famous Bird God oracle impart his important thoughts.

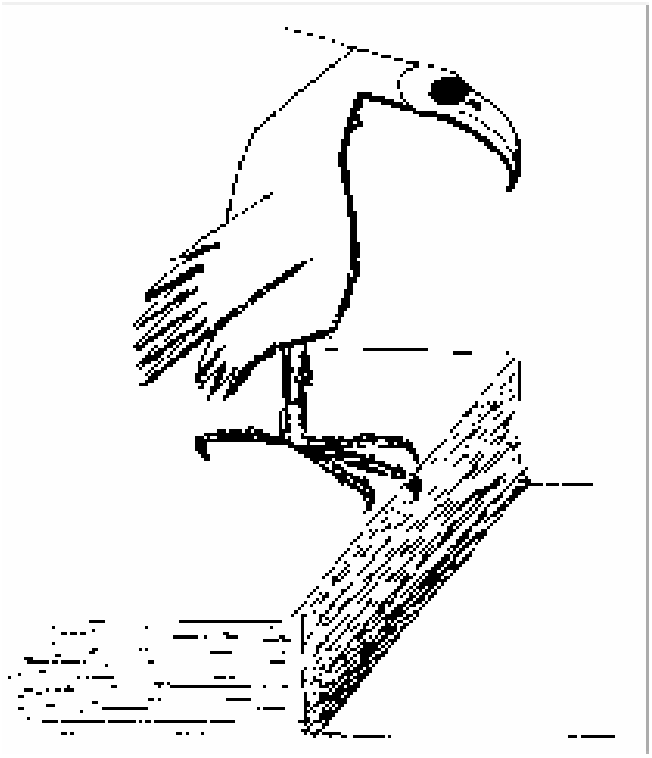
When the first Roman Emperor Julius Caesar decided to eliminate the opposition he carried the fight to the Roman outposts in Egypt where most of his enemies were located. His battle fleet set fire to enemy ships in the harbour at Alexandria, less than a mile from BG's temple on the roof of the Great Library; the fire spread to the storage areas round the docks and Caesar's army destroyed the opposition. Before he boarded ship and sailed back home to Rome he decided to visit the Bird God out of curiosity. He had heard so many rumours about this strange creature. Was the Bird God really waiting to communicate with the most powerful man on Earth? He soon found out.

At the head of his small group of Centurions, he marched boldly up the marble steps and stamped to a halt looking up at BG. Then a very strange thing occurred. Nothing was said and BG transmitted no thoughts, but Julius Caesar quite distinctly just knew he was facing an equal at the very least.

Looking down on him was a magnificent specimen of an Imperial Eagle, a perfect replica of the bronze Eagles carried by his Centurions if one ignored the leg and foot defect and overlarge eyes. But the purple colouring of its feathers gave the impression of matching Caesar's own battle cloak. A colour only the Emperor was permitted to wear.

"What do you wish to tell me O great wise bird?" asked Caesar although he actually had originally not intended to speak first. It just happened.

BG directed his thoughts at the man looking up at him but was careful to make sure that the Centurions also picked up this message. *"You must destroy all the scrolls in the Great Library but without causing loss of life. Otherwise you will never be able to retain your mighty position."* Then BG remembered where he was standing. *"Take the scrolls outside before you burn them."*



With that, BG wrapped his purple wings round himself and did the one thing no human would ever have been able to do and still remain alive. He slowly turned his back on the most powerful human on the planet.

BG was soon residing in his little temple on the roof of the empty library. There was not even a bush or blade of grass to be seen from his vantage point because the Roman soldiers had been over-enthusiastic in their burning of the scrolls. That he might be left without any kind of pleasant view had not previously occurred to BG, so intent had he been to carry out his plan.

Julius Caesar returned in triumph to Rome but was then assassinated. Unfortunately for the mission some of the contents of the Great Library, including many maps and documents which Caesar considered important, had, unknown to BG at the time, not been destroyed. Those in the know assumed Caesar had been killed because he disobeyed BG's order that was good publicity for the oracle but unfortunately was not good news for the mission. Perhaps BG should not have turned his back?

5
44BC to 135AD

The temple on the roof of the Great Library had become something of a shrine even though the beautiful shady trees had not been replaced. Pilgrims from all parts of the great but brutally oppressed Roman empire still came to pay their respects to the Bird God; the only one on Earth who had dared to turn his back on Julius Caesar and lived. BG did not care to explain the true circumstances, but could not leave for a more comfortable abode because of the pilgrims and the knowledge they imparted. Anyway he actually quite liked being worshiped and now the Great Library was being restocked with manuscripts.

An Egyptian by the name of Ptolemy had recently taken on the job of librarian and was rushing all over the empire collecting every copy of every scientific manuscript, however old, and bringing them all back to Alexandria. He was actually quite successful because the popular ruling Governor's name also happened to be Ptolemy and most citizens thought the common Ptolemy was the ruling Ptolemy and willingly offered their assistance.

So this new librarian had soon become familiarised with some of the ideas thought by BG to have been destroyed. He was in the habit of consulting BG most mornings and it was not long before it became obvious to the one-legged eagle-like robot that his wonderful brainwave of eliminating all the records had failed. BG had not allowed for Julius Caesar's double-dealing, or for the fact that many of the original manuscripts had been copied.

Ptolemy's brain was almost as dangerous to the mission as that of Aristarchus. A great deal of the man's time was being devoted to the study of planetary orbits, star positions and placing islands and cities in the correct places on new maps.

BG was seriously alarmed; each time he succeeded in discrediting or confusing one brilliant mind, so another seemed to pop up.

When the Controller eventually brought the spacecraft back from the Moon and into Earth orbit again, BG was certainly in need of a service.

Hopping about from time to time had worn down his magnificent talons and his bright purple plumage had become a little faded

This time BG was determined not to have himself stuffed straight into the replicator by that overblown Control robot yet again, without first being sure of the next image. He would demand to view the latest Little Stalk version before committing himself; he really did want two legs. One leg marked him as a robot and he was now much more than that. He was a god and gods were entitled to two legs if they wanted them!

The Controller was a little surprised to receive very clear thought instructions when BG downloaded over two centuries worth of accumulated data.

"I'm not coming up unless the replicator is fixed."

"Of course it is fixed, what do you think kept us on the Moon so long?" The Controller was being slightly optimistic. The main reason for the delay, apart from trying to teach BG a lesson following his cheeky departure last time, was because of a very small meteor. This had inconveniently hit the Moon's surface close to the resting spacecraft and although it did no damage, had covered the craft's solar panels in a thick dusty layer. In standby mode at the time, the Controller had taken no action until the "battery low" warning alarm had sounded some time later. The dust had also got into the replicator when it had been extended for servicing.

BG sensed he was not being given the full story. *"Have you tested it out on Little Stalk?"*

"Not yet, but I will before you arrive. I'll let you see him through the viewing port before we give you a service."

When BG arrived, he carefully avoided the grab arm and tried to look into the spacecraft. This was not easy because the port was tiny and BG's eye was almost as big as the entire craft. He also had to avoid all the other external gadgets, some of which were larger than he was. Although an Eagle's eyesight is remarkable, he could only just see Little Stalk who, according to BG's nature disc was a normal but very miniature Ostrich.

"Nice eyelashes" thought BG, *"walk about so I can see both legs."*

Little Stalk moved slowly to one side, but BG could not see clearly. As he shifted position so as to get a better look, a second nozzle on the replicator that he had not previously been aware of, sucked him backwards into the unit.

The Controller congratulated himself for having the foresight to add this new addition to the replicator and Little Stalk hopped awkwardly back across to a corner on his one leg.

When BG was ejected back into space he immediately noticed his usual single leg and very large foot and was naturally enough none too pleased with the Controller. When he saw the foot only possessed two toes he seriously thought about trying to perch on the top of the space craft and give it a good shaking, but his programming would not allow this, as the Controller hastily pointed out. It also pointed out that all Ostriches only possessed two toes.

"On each foot" though BG, but it was no use. Tricked again.

So BG went back to his roost on the roof of the Great Library at Alexandria in a miserable mood thinking *"how can a two-toed one-legged Ostrich with beautiful eyelashes possibly exert any influence over Ptolemy?"*

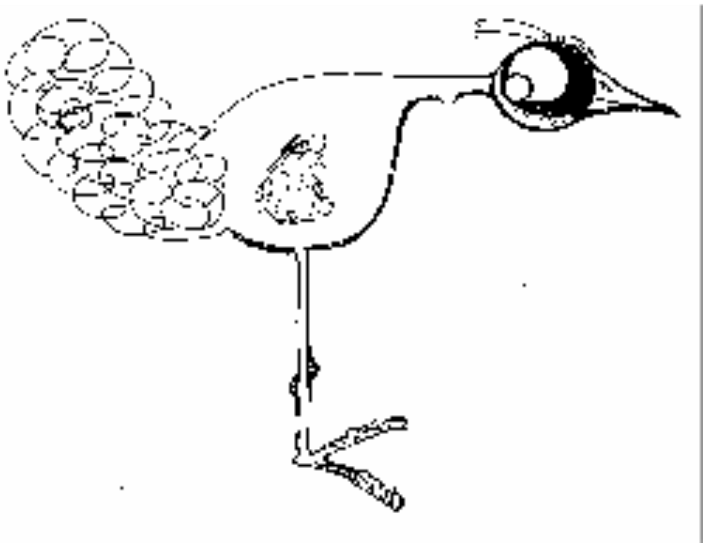
Ptolemy was surprised to find a large Ostrich instead of the familiar imperial but faded Eagle when he went to pay his usual morning visit. He was less surprised than one might suppose because of the missing leg. Ancient tales of this strange Bird God being able to change its form, but always retaining the one leg, were well documented. But an ungainly Ostrich?

BG rolled his eyes and thought nasty thoughts of what he would do on his next visit to the spacecraft. Then he noticed that Ptolemy was staring up at him. Had he thought too clearly and given something away? Surely not; he was now usually very good at keeping important thoughts to himself.

"Your eyes" Ptolemy thought, *"the middle black bits are not in the middle and just now you rolled them right round the edges in lots of little loops. Please do it again so I can watch more closely."*

So the robot Ostrich rolled his eyes again and sure enough the off-centre pupil of each eye rolled round the outside like ball-bearings in

a series of little circles. BG could feel it happening and could also see it happening because the image of Ptolemy, who he was looking at, went round and round as well. He also felt giddy and had to shut his eyes quickly before he fell off his foot. This made matters worse because the bird version of Ptolemy then appeared in his computer imager and this had rolling eyes too.



"Damn that miserable excuse for a robot Controller" thought BG, and this time Ptolemy picked it up. Not that he understood any of it. But he did understand that the Bird God was tired and wished to be left undisturbed for at least a month.

BG discovered early on that he needed more than a month to sort this mess out. As far as he could judge from the thoughts provided by Ptolemy, the librarian knew nothing of Aristarchus's idea of the Sun-at-the-centre with all the planets going round it, including a spinning Earth. But BG realised that unless he could intervene Ptolemy was well on the way to re-discovering it. Persuading Ptolemy to drop this pursuit in favour of yet another alternative would not do. BG needed a really convincing but false explanation to feed to this man.

To make matters worse copies of the Earth measurements of Eratosthenes and the Star position measurements and mapping efforts of Hipparchus, had been found by Ptolemy. These were dangerously accurate.

BG opened one eye cautiously. The world did not seem to be going round and he remained firmly balanced. Good. After a couple of months of eyes-shut contemplation, he thought he could easily have toppled to the marble steps beneath. A giddy fully-grown very overweight male Ostrich falling from a height could easily damage something.

Having discovered he had thought no solution during his long period of shut-eye, BG decided he would have to continue his contemplation with his eyes open.

Why did his eyes make him giddy? Why did the pupils run round the edges of his eyeballs in lots of little circles of their own whenever he attempted to roll his eyes? Rather like that daft description of the orbit of the Sun round the Earth which Aristotle had worked on. Ah!

BG then thought carefully about all the other daft explanations. Every single one of them made use of these little circles within bigger circles to explain the observed "wanderings" of the planets across the skies. If a planet appeared to move backwards across the sky from one night to the next it was simply rolling round the back part of its little circle at the time. These little circles could also be used to explain why the Sun seemed to get farther away in the winter or the day length changed.

Utter rubbish of course and easily explained if only these people could accept that all the planets were going round a central Sun in orbits which were, according to his data bank Ostrich egg- shaped, not circular.

At this point in his thoughts, BG found his computer brain going round in circles too. But not for long; another brainwave. Why not persuade Ptolemy to produce a wrong argument that made use of all of these wrong arguments and actually *almost* fitted the facts? Then no one would be clever enough to dispute it for thousands of years?

But what about the star positions and Earth measurements, both essential for mapping and navigating on or above a sphere? How did one discredit these? BG's computers were suddenly working overtime. Of course; these accurate measurements had been recorded by the same people who had been first to suggest these daft circles-within-circles ideas.

Carefully improve on the erroneous loopy circles part of their writings and the more or less correct data will be forgotten again. That really should do the trick.

For weeks BG encouraged Ptolemy to work on producing a unified plan which would make every last recorded movement of every last heavenly body fit in. Ptolemy needed little encouragement and by the time the pair had finished they had produced a masterpiece. Whatever new discovery might be made in the future, they had allowed for it. Not only had they invented planets going round in loopy circles within circles travelling at different speeds, but they had placed the Earth, not actually quite at the centre, but slightly offset.

Whenever Ptolemy had discovered a flaw in his mathematics, BG was ready to suggest another little alteration. When Ptolemy discovered two of the mistakes in Eratosthenes's Earth measurements, but did not realise all the mistakes cancelled each other and produced the right answer, BG encouraged him to reduce his estimate of the Earth's circumference. Two widely differing sets of measurements should confuse everyone.

Ptolemy busied himself in writing all this down in several large volumes and then, on the advice of BG, had them carefully copied and sent to other astronomers. His writings were even translated into other languages, and the translators made some more mistakes.

Finally BG prepared his report to the Controller.

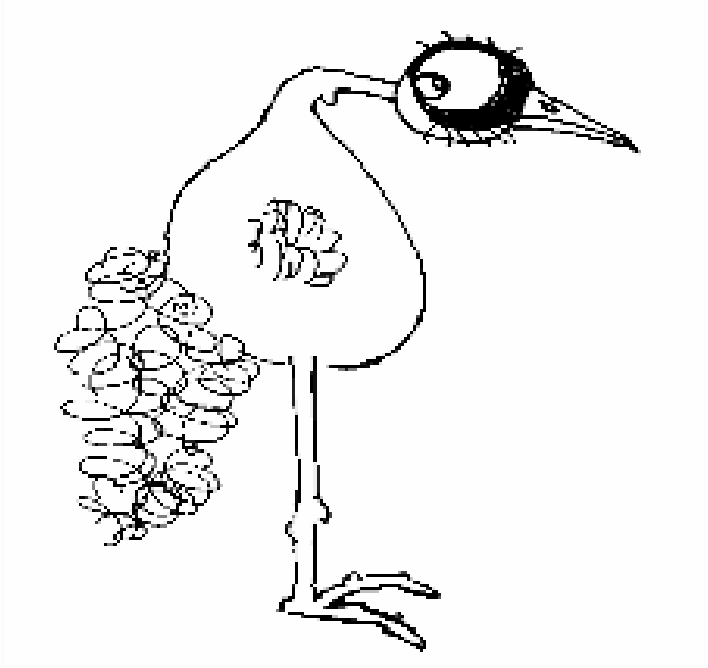
"The Earth will remain non-spinning at or near the centre of the Universe for a long time and the stars of the Galaxy will remain quite close to Earth and in the wrong places for a very long time. Can I leave this roof, get rid of my rolling eyeballs and have a holiday?"

BG's transmission was not received because the spacecraft was in standby mode on the Moon again.

So the one-legged Ostrich Bird God with beautiful eyelashes had to remain in the temple while he giddily watched another Roman Emperor steal all the important maps and scrolls. Fortunately the erroneous writings of the now dead Ptolemy were safe because of all the distributed copies.

The Great Library was again re-stocked but it was never quite the same as the first two versions and when the Arabs finally threw the Romans out of all North Africa they demolished the entire building including BG's temple on the roof. Hell-bent on destruction they might even have attempted to demolish BG as well, had he not moved house at the last minute.

BG, now with nowhere to perch, was tempted to stick his head in the desert sand like a good Ostrich but had second thoughts. He decamped to an oasis where no one was interested in threatening one-legged Ostriches, especially ones with most of their plumes in tatters.



6
650AD onwards

Back in Earth orbit, the Controller downloaded BG's latest transmission, crammed Little Stalk into the internal replicator, pulled the "renovating" lever and watched the new version emerge with more curiosity than one would normally expect from another robot.

"You may as well come up for your service" the Controller thought down to the tatty mechanical Ostrich, *"Not a lot of point in wandering round a desert, unless you plan to take your holiday there."*

BG did not need to be thought to a second time and was alongside the spacecraft in no time.

"Well, I certainly fixed their best brains that time" he boasted. *"They will be no nearer working out how to get off their miserable planet in a 1,000 years time."* He shook the remains of the desert out of his plumage and the sandy grains hung in space beside him.

This set off the meteor impact alarm and caused the new version of Little Stalk to fall sideways behind the long-range star- plotting unit. Which was just as well, but could hardly have been planned.

"I really do want that holiday. I would like to do a bit of innocent meddling. And I want to get as far away from Alexandria as possible." BG had not thought this request through properly, but the Controller had. The external grab did its work and the Ostrich version of BG, plus sand grains, disappeared in a flash. Almost immediately out popped another Ostrich, and the Controller realised all was not as it should be.

"All that sand you brought with you must have upset the replicator's horizontal hold software. Come back close and I'll give it another try. You can't go on holiday looking like that."

BG viewed the bits of himself which were visible. *"I'm still an Ostrich, nice and clean but I'm sure I'm a lot taller than last time. Is Little Stalk a stretched Ostrich?"*

"Absolutely not. He is perfectly adapted for holidaying as far away from Alexandria as possible; just as you wanted." And for once the Controller was not being economical with the truth.

BG reluctantly moved within range, was sucked in and spat back out. At least it was obvious to him he was not a third version of an Ostrich. But when he tried to peer in through a viewing port to check the miniature copy, he could see little because Little Stalk was still wedged behind the star-plotting unit. In fact all BG could see was one huge web foot on the end of a very short leg.

But when BG tried to check his own foot for comparison and to see if there was, by some miracle, actually two of them this time, he could not see even one.
"And just what exactly have you managed to concoct this time?"
"Well I was going to suggest we all went home to see if anyone had returned from wherever they might have gone to, so that we could report and have the entire spacecraft serviced properly, but you were so insistent. A holiday you demanded. Innocent meddling you demanded. As far from Alexandria as possible you demanded." "Yes but with two feet. Surely that goes without saying." BG was still trying to locate one.

"Stop complaining; at least the replicator has fixed its own fault and now you are a perfect replica of Little Stalk. You could have been stuck in elongated Ostrich mode for all time. Just in case you were unaware of this, the point on this globe that is as far away from Alexandria as one can get is in the middle of a very large ocean. An ideal spot for a holiday and an ideal spot to do some innocent holiday meddling – with the fish." The Controller pulled Little Stalk out into the open and helped it to its foot. The Controller then pulled its webbed foot out from the imitation feathers so that BG could see it properly.

"Look, these webs will help you when you become tired of flying. You will find your new Albatross version is especially lightweight and the energy renewal units are much more efficient. Even your feather covering is tougher and you have been made much lighter so as to save fuel. Enjoy you holiday and we will be in touch in 1,000 years time."

So thinking, the Controller retracted all the gadgets, trashed Little Stalk; an action he always found satisfying, punched the compacting button, and the spacecraft headed for home with a dangerous disregard for BG's safety. BG was left hanging in orbit, his imaging system faults still not fixed and having second thoughts of going quite so far from Alexandria after all. But when he tried to return to familiar territory he discovered his navigation system had been programmed to take him to the middle of a huge ocean and could not be over-ridden.

Had that ham-fisted Controller really left him on his own for the next 1,000 years? BG was beginning to have more second thoughts about having been quite so boastful. He was certain that the human race would take at least 1,000 years to recover from the confusion he had tricked Ptolemy into spreading, but would he be able to survive without a service for so long?

Ever logical, BG decided to conserve all his assets just to be on the safe side. No unnecessary use of thrusters, and no wasteful flapping or wearing anything out.

When he finally arrived over the spot that was exactly opposite Alexandria, he discovered that the Controller had been right. Lots of nothing except blue water in all directions as far as eyes could see. He now wished he had paid a bit more attention to his surroundings on the way down. Where was the land? He certainly was not going to waste power by climbing back to a higher altitude to search.

So he did what all Albatrosses do; he spread his magnificent long tapering wings and discovered his much-reduced weight enabled him to glide. Soon he had mastered the art of making use of the up-currents of wind generated by the sea waves to obtain lift and found he could glide and glide and glide. BG had no idea where he was going to, but if he was to last for a 1,000 years, he better not expend much energy flapping his wings.

Actually, after a couple of close calls when a wingtip brushed the top of a breaking wave, he discovered that this was a far better life than when he was an Eagle or an Ostrich. Being on holiday was going to be an interesting experience. After a while it also became somewhat boring and BG's thoughts started to wander.

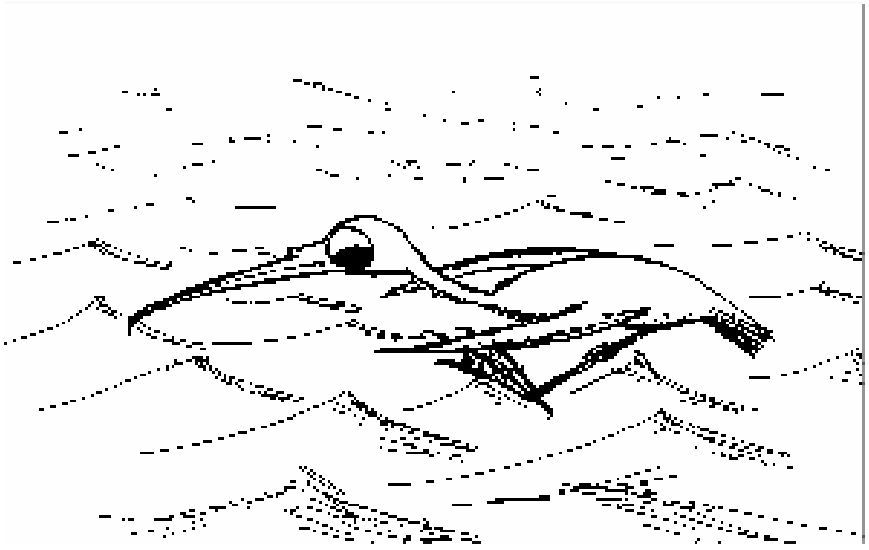
"Now just what had the Controller meant when thought to him that

his web foot would be useful? Was he expected to land on this wet stuff and paddle about? Surely not?"

But later that day he came across birds rather like himself to look at, (or at least like the bits of Little Stalk he had glimpsed) and they were actually floating on the surface of the ocean, doing nothing much but sitting there in the sunshine.

"Hi" thought one, peering up at him, but thinking nothing further.

So these Albatross birds thought with about as much intelligence as those birds he had met before. Not a lot. Nevertheless BG decided to join them; shut his wings, stuck out his foot like a water ski and skidded to an undignified halt in their midst.



"Hi" thought several at the same time and one went so far as to continue thinking *"What happened to your other foot. Shark get it?"*

Rather than bother to try explaining and not at all what a shark was, BG merely thought back *"Hi"* and *"I lost it."* He really must get his planetary species list updated.

But the advanced thinker had not finished. *"How are you going to take off again then?"*

BG, not really understanding the astounding brilliance of this thought at the time, merely replied with another *"Hi"* and set about trying to paddle in a straight line with only the one paddle.

Then the entire mob, having tired of ripping large chunks out of a sick looking fish, suddenly decided to take off.

They all paddled round to face into the wind, spread their wings wide and started beating them on the surface, paddling furiously at the same time. As they began to lift their bodies out of the water they changed from paddling to running along the surface, until finally they each became airborne and changed from a cumbersome flapping object into a graceful glider. All except BG that is. He soon discovered that one cannot run along the surface with only one foot. And if one cannot run along the surface, one cannot turn back into a graceful glider.

Of course he had to cheat in the end just to save face, but thrust-assisted take-offs should not really be used too often. However efficient his new energy pack was, it was unlikely to last for a 1,000 years at this rate of consumption.

The advanced thinker appeared surprised at this unusual take- off technique and thought *"Hi"* again. BG was tempted to go into hover mode to see if this would provoke a longer response. He decided not to bother.

The newly refurbished BG was a little disappointed; the Controller had been right. About the only living forms he could meddle with out here in the middle of nowhere were the fish, or a bunch of Albatrosses with extremely limited thought vocabularies.

Where did they live? He thought he had already learned enough about the life of birds to know that they had to lay their eggs somewhere. Surely not on the sea, or did their eggs float? Gliding close to the advanced thinker, BG did his best to obtain some answers. *"Of course I don't lay my egg in the sea. Do you think I'm stupid?"* at which point TAT tipped gracefully on a wingtip, performed a beautiful stall turn and was half a mile away before BG could ask her the next rather obvious question.

Eventually, after several hours of chasing after TAT, BG managed to send some quick questions and actually received brief answers before she glided out of her limited thought range. He discovered that tens of thousands of similar Albatrosses congregated every second year on a large flat island to mate and lay their eggs.

"Where exactly is this island?" BG was already feeling in need of a change of scenery. *"No idea, but I always recognise it when I get there,"* and off she went again. BG entertained serious thoughts of abandoning his chasing and of trying to find a slightly less agile advanced thinker in the group, but when he looked around, TAT was the only one still in sight.

It took BG days to discover that these magnificent flyers spent most of their lives crossing the great oceans looking for food. When they came across their "home" island, which was not often, the females laid their single egg, the pair guarded it with their lives until it hatched and then fed the chick for months until it could fly. Then they all resumed their ocean wandering until they next bumped into their island again a couple of years later.

This seemed an incredibly haphazard method of navigating and reproducing and BG felt sure there must be something that TAT had not thought to mention.

Over the following months, BG followed TAT for want of anything better to do and gradually came to realise that Albatrosses only ever glided and flew down-wind. Sometimes they drifted sideways, but never wasted energy trying to fly into headwinds except on takeoff. Why bother?

BG also realised that all the while they were slowly but surely travelling northwest and the weather was getting warmer. On occasion they met up with a few other seabirds but BG remained always in sight of TAT.

They passed small islands every so often, but TAT took no notice and BG was beginning to wish for some human thinking to meddle with but could detect no sign of intelligent thoughts. The wind direction changed and their slow but graceful progress now drifted towards the northeast.

At this point BG noticed that often many more Albatrosses were visible in the distance, all apparently travelling in the same direction. Soon there were hundreds and, just before land was sighted, thousands. To BG they all looked identical and he soon lost contact with TAT.

Curious as ever, BG glided low over the island, which had a sandy fringe and what appeared to be a white centre. A closer examination showed that this white area was really a dense mass of tens of thousands of Albatrosses, all sitting on the ground. BG decided to join them.

Selecting a tiny clearing right in the very middle, BG came in to land, switched on a thruster at the last moment to avoid flattening 10 or 15 sitting birds, hovered for a couple of seconds, and made a perfect one-footed landing.

Although BG did not know it at the time, this spectacular feat of flying had placed him yet again in the position of a god. Albatrosses, the most skillful flyers in the entire bird kingdom, could not do what BG had just done.

But the noise all around him was frightful. Bickering and squabbling over space and nesting stones. Bickering and squabbling whenever another bird tried to land. Bickering and squabbling whenever one tried to take off. It was all too much for BG who suddenly blasted off like a rocket and hovered low over 10,000 Albatrosses, beaks all turned skywards in amazement.

Realising he was being foolish to waste energy, he landed equally suddenly, thinking furiously to those round him *"For goodness sake shut up, the lot of you."*

And they did. The god with one leg in their midst had thought a message that they all received. Loud and clear. But BG never did manage to start any two-way thought sessions as he had done with humans.

"How do you recognise one another?"

"Everyone looks and sounds different of course" came the unhelpful answer.

"How do you locate your nest site each time you return from a fishing expedition?"

"Because it is next to my friend's nest; as always." Another unhelpful answer.

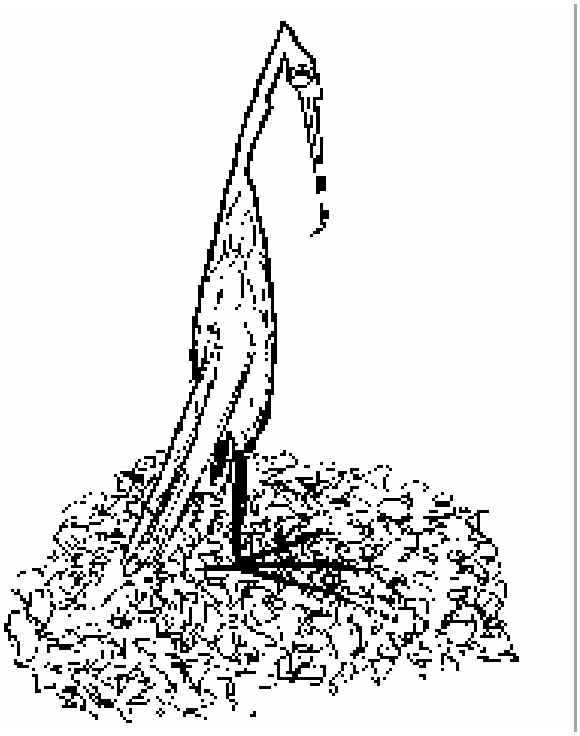
These replies, together with TAT's original unhelpful answer to BG's question of how they found the island, convinced him that there was no point in trying to do any holiday meddling with Albatross navigation. There really was nothing to meddle with.

So when the entire colony decided to leave, BG did not go with them. He simply switched himself into standby mode and stayed, standing automatically on his leg. A forlorn and somewhat depressed robot Albatross smack in the middle of an uninhabited island near the end of a chain of equally uninhabited islands in the middle of a vast ocean. Uninhabited by humans that is; or so BG supposed.

Meanwhile some 800 light years away, the Controller had landed on the vast devastated flat area of the home planet, after first discovering no evidence to indicate that any of the masters had returned. Having carried out a number of pre-programmed service operations, the Controller also switched into standby mode and stayed. A forlorn and somewhat depressed and compressed robot Controller in a golf-ball sized spacecraft smack on the middle of an uninhabited planet. Uninhabited, except by rock-eating microbes living undetected far underground that is.

7
To 1490

Every time TAT returned to breed she carefully carried a small pebble to the place where BG stood unmoving in the centre of the vast Albatross breeding colony and dropped it near his foot. She brushed his dusty back with her wings and tried to communicate. But BG remained in standby mode, unmoving and apparently dead to the world. Nevertheless, the entire colony continued to respect his demand for silence. After TAT died, one of her offspring carried on with the pebble and dusting rituals, and this duty was passed on down through the generations.



When a sudden vast increase in noise level automatically brought BG out of standby mode it took him a while to think where he was. But even before he was fully reactivated he knew well enough! The racket was all round him; cackles, shrieks and beaks clacking in alarm.

Suddenly he was grabbed from behind and roughly thrown to the ground as everywhere Albatrosses flapped their great wings and snapped their powerful beaks in angry defence of their eggs and their long-immobilised god.

BG, lying on his side where he had fallen, saw a human with a head of crinkled dark brown hair standing over him, about to bring a large wooden club smashing down on his head. Having been programmed to react extremely fast to threats of damaging violence, BG automatically went into defence mode. The club was zapped, the human received a large electric shock and BG shot into the air in a cloud of dust and small pebbles.

The robot Albatross hovered threateningly above the disabled person and every time he or she (BG could not decide which, because it acted like a man but wore a woman's skirt) tried to move, BG gave it another smaller electric shock, which flashed down at it like a miniature blue lightning strike. Meanwhile throughout the breeding colony, birds took to the air after long lumbering take-off runs and began flying round the companions of the person that BG had knocked down. Many of these people started running towards the beach where a primitive sort of small boat was floating in the shallow water.

BG, ever logical, tapped into these fleeing human thoughts and it became immediately apparent that they were running in fear for their lives, but not because of the threats from the Albatrosses. Each and every one was expecting to be struck dead at any second by the Great God of Lightning hovering above their companion, who it seemed was an important man.
"Ah," thought BG, *"a man after all."*

BG stopped the lightning strikes, partly to conserve his reserves and partly because he was not supposed to inflict permanent damage to any living thing and the man's skirt was now alight.

But where had they come from? BG performed a neat vertical landing, balanced a trifle unsteadily on his massive foot because he was still not properly reactivated, flapped out the smouldering grass of the man's skirt and directed some pointed thoughts at his fallen attacker.
The clear thought replies were a refreshing change from those of TAT and her descendants. The man's name was Hiki who was the

son of a great seaman and was himself a skilled navigator.

"Why were you sneaking about robbing bird's eggs and trying to kill me if you are a great man?" BG thought.
"We are suffering a great famine back home on our island called Green-backed Hawai'i. We came here for food only because our families are starving. We treat all seabirds with great respect, but what else can we do?"
As BG had absolutely no idea how to reply he decided not to.
"You will have to wait until I feel like answering, if ever. Now get up, leave these birds alone and introduce me to those other grass skirts."

And that is how the Great Bird God of Lightning found himself clinging with his one large webbed foot to the decking and one long wing wrapped round the mast of a large outrigger canoe, while 20 husky men in grass skirts paddled rapidly away from the island of Laysan, and a smelly sail made of matting flapped round his head in the breeze. Memories of his similarly uncomfortable boat trip with Pythagoras were dismissed with difficulty.

Now fully alert again, BG realised that his mission might well be back on track. Possibly it was time to begin serious meddling again. He also discovered that their home was not close by as he had imagined, but was thousands of miles away. And they were proposing to paddle and sail the equivalent of maybe the entire length of the Greek's vast sea in a hollowed-out tree-trunk?

BG was delighted he was an Albatross, free to leave at any moment, but was curious to see how they proposed to get home. Hiki was only too pleased to show him. From childhood he had been taught to be a navigator and had learned the names of all the stars and their positions in the sky by being shown sea-shells laid out in patterns on the sandy beach by his father. Then he had learned the rising and setting positions of pairs of prominent stars. When certain pairs dropped below the horizon at the same time, your boat was a certain distance north or south of your home island.

Remembering the home stars was easier but not so useful. Each inhabited island in the entire vast Pacific Ocean had its own home star, which all navigators knew the name of.

"You see that star," Hiki pointed to Arcturus,*"That is my home star."*

If at some time during the night the home star of a particular island was directly overhead, you were on a level with that island. All the navigator had to do was to turn east or west, keeping that star overhead and he would reach the island.

BG realised that the navigators had to remember all this because they had nothing to write on. Well, they did, but as they could not write this would not have helped. BG was certainly not going to teach them.

"Why are the home stars less important?" BG thought.
"Difficult to determine when a star really is directly overhead. Much easier to use the setting pairs method," came the reply, *"Especially when they are cut into the side of the boat to remind you."* Hiki pointed to the marks that BG had not noticed.

"And when you arrive at the right level, how do you decide whether to turn east or west?"
Hiki's mind went blank and BG gathered that even Hiki was not too sure. So BG watched closely while Hiki navigated all the way back to Green-backed Hawai'i. His conclusion was that, although these people were skilled sailors and could often use the wave directions as additional pointers, their skills were primitive. Whilst they were no danger to his mission BG could not resist the urge to meddle just a little.

"Could I give you some advice Hiki?" Hiki wondered what was coming next from this strange Bird God who obviously was no sailor.
"When next you have doubts about whether to turn east or west under a home star, follow the next Albatross you come across." BG, knowing only too well that Albatrosses had no idea where they were going, thought very quietly to himself *"If that bit of useless advice is taken up by their navigators, it should cause confusion for generations."*
As soon as they at last landed on their home island, Hiki at once started provisioning for another trip, this time a journey south to the island of Tahiti.
"We will sail south till this star is overhead," Hiki pointed to a bright star which BG realised with a jolt was his own home star. *"Then on until these stars rise and set together."* He indicated Pollux and Sirius.

"Then what?" enquired BG politely. *"Oh, just turn due west, or east, until you run into the island of*

Tahiti of course." Of course. Hiki had obviously not taken much notice of BG's advice to follow the nearest Albatross.

"Would BG care to join him?"

"No, BG would not!" He had no wish to travel one third of the way round this planet in half a tree trunk. It was time to leave these primitive, dangerously care-free adventurers and continue with his holiday before the Controller turned up.

BG decided to resume his holiday by continuing on due east until he became bored again, making use of high altitude wind patterns whenever possible.

Thus it came about that BG became the first Albatross to cross both North America and North Africa and when he splashed down in the sea just north of the great Indian trading port of Mumbai he gave himself the first proper bath he had enjoyed for almost a 1,000 years.

That night he peered up into the starlit sky. Sure enough there was the Hawaiian home star high overhead just as it had been when he left Hawaii. At least his own navigation had been good. He had travelled directly round an imaginary line of latitude and the home star of that latitude was still overhead. Of course it was.

Perhaps Hiki and his friends were not quite as ignorant as he had thought. Their use of the stars, he suddenly realised, was far in advance of the old Greek method being used throughout the Mediterranean Sea when he had left all those years ago. Had matters improved since his days as the Bird God oracle of Alexandria? He was soon to have his answer.

As soon as BG spotted a sailing vessel heading out from the anchorage off Mumbai, he activated a thruster, took off from the choppy water more like a rocket than an Albatross and moments later made a perfect landing on the stern rail of a large Arabian dhow. There he perched, perfectly balanced for once on his only foot, and waited for one of the crew to notice him. He perched there for most of the morning because the only crew-member visible was fast asleep on deck and the boat appeared to be sailing itself.

The single large sail was filled with the breeze of the gentle seasonal winds and the boat slid silently through the clear blue water, holding its course without effort.

When at last the sailor awoke sufficiently to notice the apparition grasping the stern rail, the response was unexpected. He stared silently at BG. BG could at first detect no thoughts, then suddenly *"It's the Great Ptolemy Bird God from Alexandria."* The thought blanked out and the man covered his head with his hands and started a high-pitched wailing cry of terror.

Several other sailors rushed up on deck and one, obviously the captain, aimed a kick at the wailing man, took one look at BG and shouted to the others, "Rubbish, it's an Albatross." The captain aimed another kick at the still wailing man at the same time shouting at him "The Great Ptolemy Bird God was an Ostrich you fool. Everyone who has read the Almagest knows that." The sailor, who could not even read and was not familiar with the Arabic translation of Ptolemy's works either, did not know that, but was wise enough not to say so.
BG, not wishing to be kicked, hastily thought communicated with the captain and reassured him that he was indeed the Great Bird God mentioned by Ptolemy, but being at sea he was naturally using a different cloak.

The captain, still not fully awake, was not sure whether he had imagined these thoughts or was still dreaming.

"If you really are the Great Bird God and not just an Albatross who has lost a leg to a shark, explain to me why this compass only works sometimes." He spoke rather than thought, and pointed to the round wooden bowl near the helm. The floating needle in the bowl was so unreliable he had threatened to fling it overboard more than once. He thought to himself *"If this animal perched on the rail of his ship really was the great navigator and astronomer the ancients claimed, let him sort it out. If not, I might wring its neck and throw it in the stew pot."*
BG had no real idea what the captain was thinking about other than threatening to eat him but was curious. A compass?
"Well," thought BG, *"I am not familiar with this compass, but I can tell you exactly where you are if that is of any help?"*

It was not, but at least it gave BG time to drop down from his perch and hop across to the wooden bowl, all the while searching his data bank for information on compasses.

He peered into the bowl. Floating on water in the bowl was a straw which pointed, he realised, more or less north/south. He watched closely as the straw wandered a little from side to side with the rocking motion of the ship. Curious indeed, but then his data bank supplied the answer. Inside the straw there must be a magnetised needle of metal and it was this needle that was seeking the magnetic pole of the planet. The straw was only being used to keep the needle afloat. *"Primitive, but quite clever. And pretty useless, unless they know where the magne...."* BG stopped thinking abruptly, but it was too late. The captain was eyeing him curiously.

"So you really are the Great Bird God" the captain thought, rather than spoke aloud this time. *"Why is my compass useless unless I know where the magne is?"*

BG, switched to rapid quiet thought mode. He was going to be in trouble with the Controller next time he reported unless he took some fast diverting action. *"Right captain, what is it you find so unreliable about this wonderful invention of yours."*

"It's not my invention; Arab sailors have been using this compass for generations now. You take a piece of loadstone and stroke a needle of iron with it. It must be made of iron; gold, copper or bronze needles will not work. Then float it on water and it magically points to the northern stars. Only it does not work properly. As we cross the ocean back from India to the Red Sea it gradually points further and further to the west of north. When our brothers use it in the Mediterranean, it points even further west. Sometimes it wanders all over the place."

BG could safely give him a confusing answer to the wandering part. *"The needle is attracted to iron. Although you probably know not to put a cooking pot near it, there is sometimes iron on the seabed and that is what causes it to wander suddenly."*

The captain nodded, clearly waiting for the oracle to tell him the rest. *"Why the gradual change the further west we sail?" "There are great metal deposits deep in the Great Atlantic Sea beyond the Pillars of Hercules and it is these that pull the needle from its true northerly course.*

The closer you sail towards this sea, the more the needle is deflected." BG felt really pleased with himself. He had considered confusing the captain with the truth but who would understand that the magnetic pole was nowhere near the true North Pole or that it moved about daily?

And in any case, once this information became known and understood, someone would also realise that the nearer one got to the magnetic pole, the more the needle would try to dip downwards. Another navigational aid they could do without knowing about.

Oddly the captain was not as pleased with this explanation as BG had expected. *"The Pillars of Hercules fell down thousands of years ago. Are you sure about the metal?"*

"Absolutely, and I can give you a tip to make your compass work better in bad weather." BG knew someone would work this out soon anyway. *"Replace the water in the bowl with oil. Stick the needle on a piece of your paper and float it on the oil. That way it is easier to read."*

It was indeed and the captain never again doubted that the one-legged Albatross was not also the Great Bird God of Alexandria.

But during the trip, which followed a circular route back to the Red Sea, simply riding the seasonal winds in a similar manner to the Albatrosses in the Great Ocean, BG learned from the captain's thoughts of disturbing scientific advances by primitive humans in Europe.

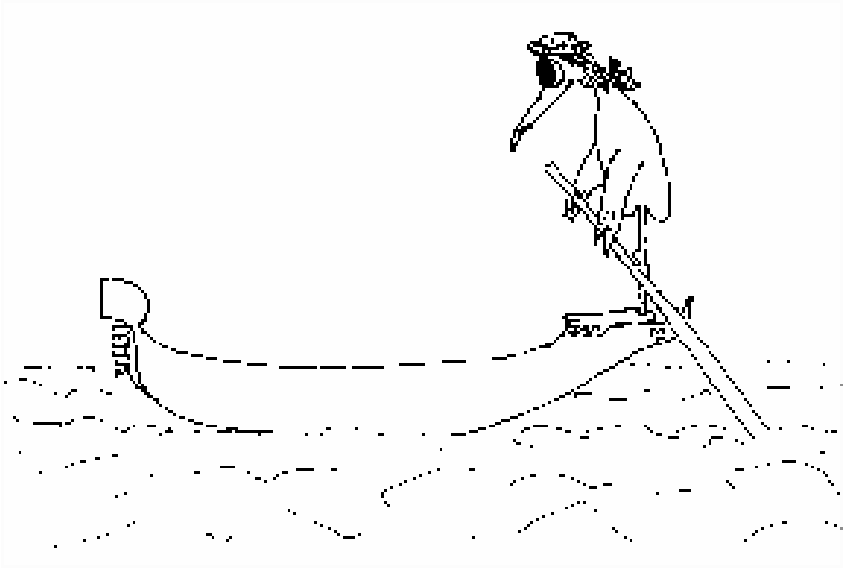
As it was these same primitive people who were buying all the gold, perfumes and other treasures the captain and his colleagues were bringing back from the East, BG began to have serious doubts about how primitive they really were.

Perhaps it was time to visit the city on the water where all these eastern treasures were bought and sold.

BG left the ship one night as it neared the Arabian coast and, after flying over the city of Alexandria just to check that the library had not been rebuilt, flew on across the Mediterranean Sea, and up to the city on water; Venice.

As he circled the city, marveling at the advanced architecture, his imaging software went on the blink yet again. One moment he was viewing a normal human standing on a thin boat and the next, the man had been transformed into another of those half-and-half images.

BG wondered where the Controller had disappeared to. According to his planetary position plotter, the 1,000 years had run out and although Venice appeared wet enough for a seabird, he really did need a service and a change of appearance if he was going to be able to confuse these Europeans successfully.



The dormant spacecraft had been programmed to be re-activated by the appearance of the Great Comet of 1456, although the craft would of course activate automatically in any emergency situation.

But unfortunately the robot Controller had switched to standby mode without realising that the Great Comet wake up call would only work if there was a Great Comet. It had been a wonderful alarm clock on the Moon but not much use when the nearest the Great Comet came to the Controller's home planet was about 800 light years.

The spacecraft was brought to life over 30 years late when the ground began breaking up beneath it. At long last the slowly spinning planet had become unstable because of the large chunk that had been blown off about 2,000 years earlier. The original slight wobble had become progressively larger until suddenly the entire planet decided to shake itself into any number of smaller pieces.

The spacecraft blasted off in a hurry, it arrived once more in the wrong solar system, and once more the Controller had to waste time looking for the right one.

But arrive in Earth orbit it eventually did and when at last BG was able to offload his accumulated information to the Controller, he felt much lighter. All he needed now was a full service to fix his imaging software glitch and two legs. He would be absolutely insistent this time; two legs guaranteed or he would resign. He was becoming quite neurotic over this point

When he put his demand to the Controller, he was assured that the replicator had been given a complete overhaul despite the home planet breaking up beneath the spacecraft. BG's software would certainly be de-bugged and this time he would have two legs. Until a new two-legged version of Little Stalk was produced, he would not be called up to be serviced.

So when a new version of Little Stalk emerged from the machine, still with only one leg, the Controller informed BG that he was to remain as an Albatross for the time being owing to the enormous success he had achieved in that form over the past 1,000 years. As soon as it had analysed BG's data properly it would decide if any changes should be made. Not exactly the entire truth, but near enough. The Controller was becoming a little fed up with BG and his complaints.

8
1491-1494

The ocean-going version of the Great Bird God did not like the dirty, noisy city of Venice where nothing much by way of navigation or astronomy appeared to be taking place. He also did not like having stones thrown at him by scruffy little boys who thought he was a scavenging seagull and obviously had no respect for gods of any kind. But he did manage to update his data bank by thinking in on a number of human discussions.

Because of this BG registered yet another athletic achievement. He became the first Albatross to fly across Italy, which he did in a matter of minutes. When he arrived on the far side, he alighted carefully on the rail of a large sailing ship, which was anchored at the port of Genoa. Perched on a sailing ship was more comfortable than paddling in a lop-sided fashion round the garbage-filled canals of Venice but he was bored with being on holiday. Time to find out what the Controller thought of his downloaded data.

"Well?" BG thought, *"what next?"* and was surprised at the answer. *"While you have been sunbathing, I have solved the problem with the replicator. You can come up for a refit now."*

BG was so delighted with this news that he completely forgot to double check on the latest version of Little Stalk. After all he had been an Albatross for a very long time. He homed straight in, was sucked into the replicator and ejected again in next to no time. A few seconds later he realised he still only had one foot, but he really had expected this. He was also very much smaller, not as large as the head of his previous self in fact.

"I thought you had fixed it"

"No, you miss-thought. I informed you I had solved the problem. It lies in the original programming as we thought, but I cannot fix it. Anyway you look charming and no one will notice you only have one leg."

"Where is Little Stalk," BG demanded, a trifle late. *"I want to see exactly what it looks like. I bet it doesn't look like me."*

"It does but it is so small of course that you can't see it from out there. It's resting at the moment. The singing tires it out."
"The singing? Just what sort of bird am I this time?" But the Controller was not to be distracted.
"I have been picking up thoughts from the captain of the ship you have just adopted. Introduce yourself and then keep an eye on him. Now buzz off while I work out how to keep Little Stalk quiet."

As had so often happened in the past, the Controller, BG and the replicator unit had, between them, somehow made yet another good decision. As the tiny songbird with one large leg landed awkwardly in the rigging, who should be standing on deck but another man who had read Ptolemy's description. Why he should think, even for a split second, that this might be the same bird Ptolemy had met was a mystery, but he did.

BG picked up these thoughts instantly and carefully thought back the fact that he was indeed the same bird, although at present considerably smaller, and how did this sailor, who was wearing an odd-looking and overlarge floppy hat, know anything about Ptolemy, a man who had died over 1,300 years previously?

"I've read his writings on astronomy and navigation. My brother is a mapmaker and uses the Ptolemy method of laying out lines of latitude and longitude. But it is very difficult to show the right positions of cities and coastlines on a flat map when these places are really on the surface of a globe you know." This answer was a surprise to the new miniscule Bird God.

"Especially when you don't know how big the globe is"
thought BG a little too forcefully, probably because he was still distracted by Little Stalk's new-found ability to sing. Mapmakers apparently now accepted that the Earth was a globe and not a flat plate. How had that happened? But the sailor was still thinking.

"How right you are, and that is where I disagree with Ptolemy and where you might be able to help. If you really were with him perhaps you can explain how he obtained the measurements of the Earth's circumference."
This was a tricky one. BG could hardly admit to his part in confusing Ptolemy or that the Eratosthenes estimate had, by luck, been alarmingly accurate.

"Claudius, for that was the name Ptolemy used when conversing with friends, obtained his measurements by altering the mistakes made by Eratosthenes. A very clever man was Claudius."

It was obvious from his expression that the sailor no longer doubted that BG had met Ptolemy, but he was not convinced that Ptolemy had been correct.

"But I have done a lot of research and I am inclined to agree with the great explorer Marco Polo who, as you know visited China by travelling overland to the east."

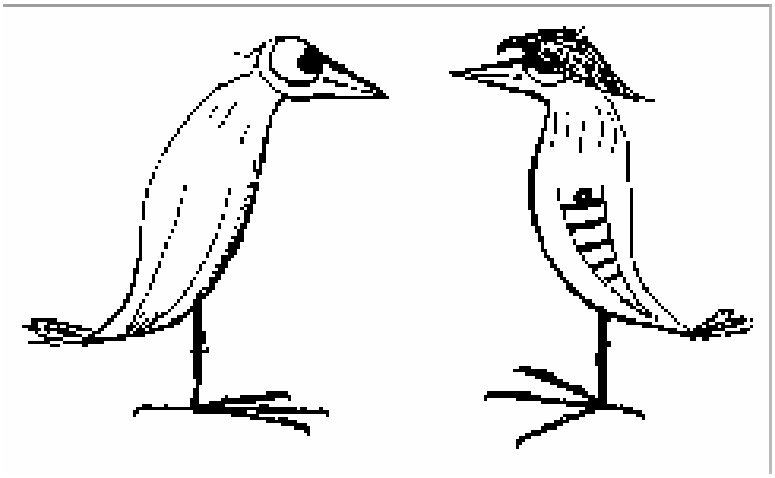
BG did not know; the Controller had not downloaded the name into his data bank, but he was not going to admit it.

"And what conclusions have you come to?"
"Marco Polo is right, our Earth is much smaller than everyone has previously claimed. About half the size Ptolemy wrote of."
"This sailor seems very sure of himself, I wonder who he is?"
thought BG quietly, but again, not quietly enough. Had the singing software altered his thinking volume control?

"I am the great Christopher Columbus, mariner of the Ocean Sea. Did you not recognise me?" Columbus puffed out his chest and stretched to his full height, which was not a lot. BG's double vision returned and seeing Columbus as a one-legged songbird in a large floppy hat made him forget his next question. It took quite a time for his thoughts to become serious again.
"Actually I have been away for rather a long time and have not had time to catch up with the latest news. Mariner of the Ocean Sea? Which one?"
"The great Atlantic Ocean of course. The Ocean Sea is an expression we mariners use when we are discussing the Atlantic. There is no other unless one counts this little Mediterranean Sea or the Arabian Sea."

BG very quietly wondered what this buffoon would think if he told him of another vast ocean that actually covered two fifths of his planet's surface.
But Columbus was still thinking. *"I am off to Spain to obtain vessels in order to sail right across the mighty Atlantic all the way to India on the orders of the King and Queen of Spain."*
"Sail west across the Atlantic to India?" thought BG, careful not to appear surprised.

"Certainly west. You cannot get there by sailing east except by going all round the bottom of Africa like the Portuguese have just about managed to do. Much quicker my way I can assure you and when I succeed I will be made a lord and given the title "Admiral of the Ocean Sea."
"I have been away a long time" Another quiet BG thought, followed by yet another. *"The Portuguese have already sailed round the southern tip of Africa, have they? So much for that Arab captain who thought the Europeans primitive."* His attempts to think quietly somehow triggered another image glitch – this time producing the old original sort which had triggered the Heraclides double-image.



Columbus, taking BG's thought silence as a sign of admiration, could not be stopped from passing all his own thoughts across.
"It has been agreed that all new lands on the far side of the Atlantic will belong to Spain and all on this side to Portugal. Portugal have lost badly from this because nearly everywhere on their side of the Atlantic has already been discovered and doesn't count. But over the other side of the Atlantic lies China and India and the islands which supply the Arab traders with spices. All that will belong to Spain once I have sailed west to India."
"If China and India and these islands have already been discovered and obviously people live there, how can Portugal and Spain divide the entire Earth between them?" BG was wondering which of these two countries would be claiming the vast land mass between the Atlantic and the other ocean that neither appeared to know about.

"Oh, non-Christian countries don't count." "What about this country? Why are they are not included in the division?"
"Ah," Columbus blushed and a garbled collection of thoughts emerged, mostly centred on the man's confusion over his religious beliefs in an Almighty God and the object perched in front of him which Ptolemy had called the Great Bird God. Having come to a decision his mind cleared. *"The Pope in Rome is God's representative here on Earth, and looks after this country's interests and he has agreed that he will not claim any titles. But in return, Portugal and Spain will convert to Christianity any heathens they discover ."*

BG realised he had been demoted but was puzzled by Columbus's failure to mention several other powerful European countries that had been excluded from the division of spoils, but BG got the message anyway. Greed.

With a small amount of good fortune and a little help from this Columbus fellow, he the Great small Bird minor god, could put a stop to the alarming advances in navigation made recently behind his back. Then another silent thought struck him. *"What fresh advances had been made in astronomy by these primitive Europeans?"*
The sooner he could report these worrying developments and receive some new instructions and an update the better. Finally he remembered to ask Columbus if he happened to know what sort of bird he was at present. *"Not that it matters mind you, but I need it for my records."*
Columbus was one of the few people in Genoa who actually knew. *"Apart from your missing leg of course, you bear a remarkable resemblance to a songbird; a Canary. These birds are only found in the Canary Islands and the Madeira Islands and I have one in a cage in my house on the island of Porto Santo."*

Christopher Columbus eventually managed to persuade the Spanish to give him two ex-Portuguese caravels, small sea-going sailing ships which he named Nina and Pinta. But neither were grand enough for his personal use so he persuaded Queen Isabella to lend him a larger vessel, the Santa Maria. He really would have been better to have obtained just one new ship rather than three old ones, but Admirals had to be in charge of more than one or they were merely Captains.

Owing to a money shortage, the crews would not be paid, but were promised a share of the profits from the sale of all the gold and spices they would bring back from China and India. Columbus was careful not to tell them he had no money to pay for these goods and that they would be expected to fight for anything they were going to get. They would be nothing more than a band of pirates really. Also, because he had little money for provisioning three ships and their compliment of several hundred men, life en route was going to be tough.

BG watched these antics perched on a guard-rail of the Santa Maria and was amazed that so many men could be packed into such small ships. *"Almost like being sucked into the replicator"* he thought.

When eventually the little fleet left Spain and headed out into the Atlantic, BG spent most of his time watching the Admiral carefully, hoping to discover just how good a navigator he was. The ship's magnetic compass was a slight improvement on the Arab version but Columbus obviously did not trust it. He took angular measurements of the pole stars or the height of the noon Sun to assess the ship's latitude by using a brass astrolabe, a primitive angle-measuring device which was hung in the rigging. But he had no way of knowing how far west he had travelled other than by estimating the vessel's speed through the water. This a seaman did by throwing a piece of wood over the bow and counting off the seconds until it reached the stern.

When they arrived in the Canary Islands after a surprisingly uneventful voyage, the expedition's troubles began. They tried to buy fresh meat because their stock was already beginning to rot, but no one would sell at the low prices Columbus offered. Then they discovered that the rudder of the fastest little ship, the Pinta was falling off.

Whilst waiting in the Canary Islands for the repairs to be completed and having failed miserably to make thought contact with the few real Canaries he encountered, BG decided to contact the Controller who seemed to be avoiding him. BG hoped the communication problem was being caused by Little Stalk's singing, but he was wrong. The Controller had been concerned about this Columbus expedition and had been busy accessing thoughts from all over southern Europe in order to decide on the best course of action.

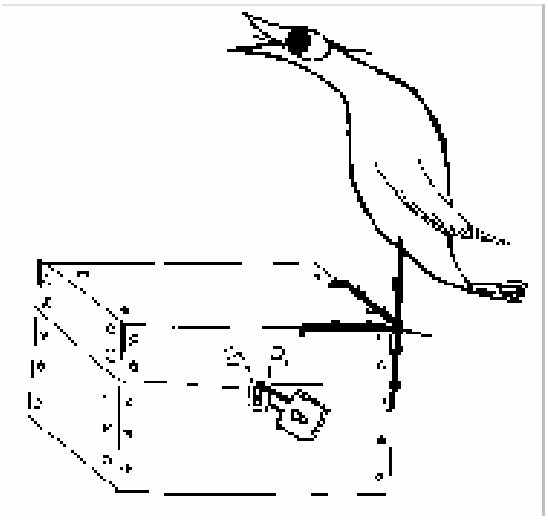
"We both know Columbus cannot reach China or India by sailing directly west because a vast continent is in the way. So you must trick him into thinking he has reached India when he bumps into this land the Europeans obviously know nothing about. This will confuse everyone for generations."

The Controller was obviously pleased with itself, but BG had his doubts. *"Oh come on, the daft Admiral is carrying a message of greeting to the Emperor of China from the King and Queen of Spain. Even he knows that China comes before India if you sail west. He's got a globe in his cabin with these countries marked on it. How do I convince him that he has somehow missed China, a huge country larger than the whole of Europe, and arrived on the east coast of India?"* A good point thought BG, but the Controller was not interested.

"Oh you will think of something, you always do." Contact was then abruptly cut off before BG could complain about the imaging glitch.

The first point to dawn on BG was that he was now committed to a long ocean voyage with an expedition that was seriously under-funded and led by a maniac who was about to set out without enough provisions for even one month at sea. The second point was that it was fortunate for all the sailors that there was indeed a large lump of land in the way, otherwise they would all starve to death long before they did reach China.

The trip across the Atlantic Ocean was an uncomfortable one for the men packed into the three small sailing ships. BG, now perched on top of the Admiral's sea chest in his stern cabin, was probably the most comfortable of all. He spent much of the time teaching himself to sing. The Admiral, knowing he only had food and water for three weeks, drove his little fleet forward at full speed; which was actually little more than walking pace. Those of the crew that still believed the Earth was a flat dish were in a constant state of fear, thinking they might fall over the edge at any moment. All in all, not a happy adventure for any of them.



After 33 days at sea, all the while being pushed slightly south of west by the prevailing trade winds and current, they sighted land. This turned out to be a small sandy uninhabited island without water or vegetation. The next island had water and the few local human inhabitants sensibly ran in fear for their lives.

But the expedition's luck changed when they called in at a large island where the locals were friendly and willing to trade food and water for a few glass beads. They also indicated that there were large and very rich lands to the northwest.

"China," thought Columbus to BG who stopped his singing practice abruptly and concentrated on thinking.

"Those rich lands will be the eastern side of India. You missed China because you were forced south by those storms."

"Yes, more like India, and all this water and these scattered sandy islands must mean we are somewhere in the delta at the outflow of the mighty Ganges River that Marco Polo wrote about." Columbus fortunately did not need much convincing.

A few days later, just as the ships were nearing this land they had been told about, a very strong wind suddenly caught the flagship in its grip. The two smaller caravels managed to drop anchor in a bay but the Santa Maria was smashed against the rocks and slowly sank. BG promptly flew to the Pinta and had located a comfortable perch long before the bedraggled and embarrassed Admiral arrived.

This was a good move on BG's part because now all the men had to fit into two ships not three and good perches were difficult to find.

Columbus had already discovered that the natives of this land were friendly because they had helped with the rescue and not stolen anything. They even presented him with a Parrot in a cage.

In return Columbus rewarded them with gifts of a few trinkets, then kidnapped a married couple, claimed this part of India which he named Hispaniola on behalf of the King and Queen of Spain, and left a garrison of 40 soldiers to guard it until his return. This at least gave everyone else a little more breathing space.

BG realised that the rest of his job had been done for him. Columbus was convinced he had now reached India even though he had not sailed one fifth of the way there. He had not, in truth yet even discovered the vast continent that barred the way to the mighty ocean, because Hispaniola was actually only another island.

Nina and Pinto, the Admiral, the Parrot and BG sailed back across the Atlantic and for some reason that BG never quite understood, landed first in Portugal.

There, instead of being flung into jail, Columbus showed off the captured "Indians" as evidence to the King that he had discovered a new westerly route to India and rather foolishly informed him that he had claimed all these lands on behalf of Spain.

BG, perched on the shoulder of Columbus during the audience with the King of Portugal (who was also wearing a large floppy hat), having very firmly put his large and only foot down over the Admiral's suggestion that the Parrot should take BG's place. The Parrot could not even sing, let alone think.

9
1494 – 1543

No sooner had BG returned to Spain with Columbus who, incidentally, received a hero's welcome, than he was called up to the spacecraft for a long thought session with the Controller.

The thoughts the Controller had been collecting from places as far apart as Italy, Portugal, England, France, Germany and even Poland following the Columbus "discovery" had almost overloaded the input discs. Little Stalk's constant singing had done nothing to help the Controller to decide on the next course of action. Maybe the attendance of BG in person might help?

The now fluent singing BG was also expecting a hero's welcome. Had he not persuaded Columbus that he had sailed right past China and arrived in India, just as instructed? Wrong again!

"While you have been wandering about the Atlantic and meeting with royalty, I have been accessing the thoughts of astronomers and navigators all over Europe, who, if left undisturbed, are on the track of working out how to determine longitude. If they succeed in this, everyone will soon be able to navigate properly. Then they will be able to pinpoint their position anywhere on Earth. This will enable them to discover the exact size and shape of this planet, will realise it is spinning, will realise it is not at the centre of the...."

BG interrupted. *"I get the message, but I can't be in two or three places at the same time. If I didn't have to devote so much time trying to stand upright I could be more productive. Is the replicator properly fixed yet?"*

"No, it's not."

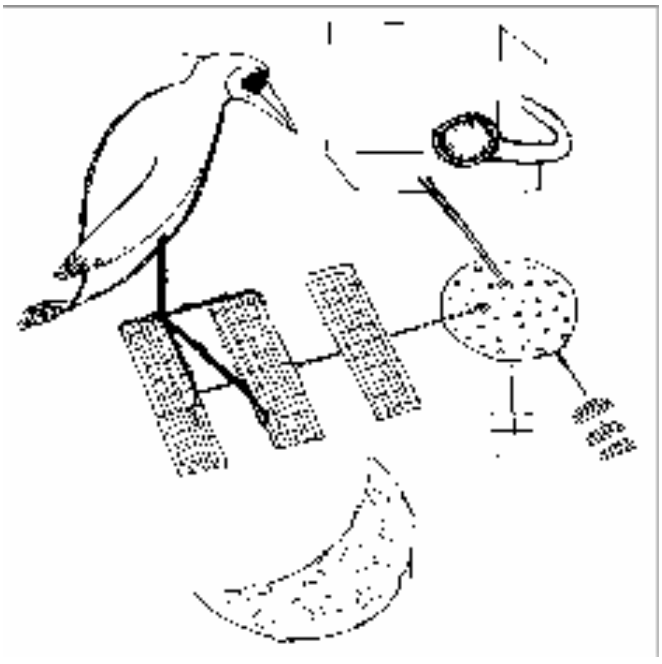
BG eyed the grab arm and sucking mechanism, moved hastily out of range and perched on the far end of a solar panel. The thought tone of the Controller was dangerously calm. This was not the moment to ask for a fluorescent badge panel after all. It was time to appear 100% helpful or risk being zapped straight into the trash can, never to see the light of day again.

BG quickly assembled his thoughts. *"This Columbus Admiral of the*

Ocean Seas man has an idea that he can use the Moon's position in the sky to tell him how far west he has sailed. Fine in theory, but without a clock and some sort of written tables I don't see it being much use, even if he did know the size of the Earth, which he doesn't." BG, sunlight glinting off his splendid green and yellow plumage, was thinking he really had done a good job in confusing everyone over the size of the Earth.

"Quite," thought the Controller, still far too calmly. *"If you can think that far back, you will recall that less than a minute ago I mentioned scientists are on the right track. I did not suggest that they may be, but that they* are *on the right track."*

BG tried to move even further out of range and the solar panel quivered. The Controller placed its large foot on Little Stalk's small head, which effectively stopped the singing. Perhaps the capsule should be de-pressurised, even at the risk of computer damage. At least that would shut the little pest up.



The Controller's lecture continued. *"If and when one of them manages to provide advance predictions of the positions of the Moon in the night sky, sailors will be able to read the tables, measure the angle between a prominent star and the Moon and establish their longitude; how far round the Earth from home they have sailed. Without a clock, I might add."*

"Measure the angle between a star and the Moon?" BG had watched the efforts of Columbus when he was trying to take the simple measurement of the height above the surface of the noon Sun with an astrolabe from the rolling deck of a ship. *"Even my limited data bank tells me that the measurement would have to be very accurate to be of any use. 10 times more accurate than a Sun height measurement and those are usually way off. I know, I spent hours watching a self-proclaimed expert. Astrolabes and quadrants are far too inaccurate. They can only measure upright angles anyway"*

BG was right, they would be useless, and once in the mood, new thoughts kept cropping up. *"Why are we so concerned? These humans are never going to get off their planet without accurate timers. Nothing less than atomic clocks are accurate enough. And computers. Goodness me, they have not even invented electricity yet. Why not forget all this sailing about and misleading weird Admirals and just sabotage any efforts to develop an atomic clock? Perhaps I could visit the Moon with you while we wait? Its surface looks interesting. I bet my singing would carry for miles and miles."*

But the Controller was in charge and it had only been programmed to prevent advances in navigation or astronomy. It was not part of its job to let BG practice his singing on the Moon, or for that matter to point out that, because there was no atmosphere, his singing would not be heard, even if there was anyone listening, which there wasn't.

Actually the Controller had been giving its programming some thought but Little Stalk's singing, which was decidedly out of tune, had prevented any conclusion. Now, with the menace temporarily silenced, it thought about this again, this time with BG thinking in.

"We were sent on a mission to search for advanced life and found it. We were also programmed to do our best to prevent anyone leaving their own planet and causing trouble elsewhere in the Galaxy. This we were to accomplish by sabotaging scientific advances in astronomy or navigation. We were not given the authority to prevent the invention of an atomic clock or a computer or even a space rocket. Why not?"

The Controller could not answer its own question and neither could BG. They both thought about this for ages and only succeeded in giving themselves mechanical headaches.

Meanwhile Little Stalk, annoyed at being left out of the thinking session and upset at having its head stood on, decided to open its mind to anyone who would care to tune in.

"I want to go home!" it thought. Then, when it received no indication that either of the other robots had received this message, it jerked its head free and tried again, this time singing at the same time. *"I want to go home!"*

The Controller aimed a vicious kick at Little Stalk, missed, and only just kept its balance.

"That's it," thought BG, *"Home is the answer. We were never programmed for a complete expedition, only a search mission. Find life, check it out, and report back. The programming to mess up scientific advances in navigation and astronomy was only included in case we could not report back at once or something went wrong with our spacecraft. Our designers back home will re-programme us once they have received our report."*

The Controller pointed out this thinking was useless; there was no home to report to. They were now on their own and stuck with an outdated programme. But was it really outdated? There was something decidedly odd about the replicator software.

The Controller decided to get rid of BG before he did any more damage to the solar panel he was perched on. *"Go and make sure these scientists don't start working together. Start with confusing the one living in Portugal. I'll punch the co-ordinates into your navigation system, but do you really think you should go dressed as a Canary?"*
BG went dressed as a Canary. It was safer than taking another chance with the replicator with the Controller in its present mood.

On return to Earth, BG, as programmed, paid a visit to a Jewish astronomer and mathematician by the name of Abraham Zacuto who was now living in Portugal, having been thrown out of Spain for being cleverer than the king. Columbus had carried copies of Zacuto's book of Sun height measurements with him on that first voyage of discovery.

If and when better angle measuring instruments were invented, Zacuto's book would enable mariners to navigate up and down the Earth better. This would be a great help to the Portuguese who needed to know how far south they had sailed in order to get safely round the bottom of Africa en route to India.

So BG's current mission was to discredit Zacuto, his measurements and his ideas, before someone was encouraged to invent a better angle-measuring device to go with the tables. But when BG arrived, the old man was so wrapped up in his own thoughts that BG, try as he might could not make contact. Fluttering round the house or even hovering right in front of the man's face failed to elicit a response.

Reluctant to admit that this mission was a failure, BG was forced to devote some computer time to serious thought. Then he organised his flight plan and zoomed off to the king's palace.

What exactly BG communicated to the King of Portugal was immediately erased from his memory bank in case the Controller should disapprove, but it had something to do with Zacuto having been the man responsible for encouraging Columbus to work for the Spanish rather than the Portuguese. Too late, BG realised he had also erased the software fault evidence of half-BG-half-human image of the king.

The old astronomer sensibly left Portugal before he could be arrested. He fled in such a hurry that he left most of his papers behind. Because he was not really a spy for the Spanish, he dare not go back there either, so he went to North Africa where, fortunately for the mission, no one was interested in his tables.

BG also left Portugal intending to visit counties further north, in accordance with revised instructions from the Controller, but ran into a snowstorm, an experience that was entirely new to him and uncomfortable for a Canary.

A quick unauthorised about turn took him back to Lisbon, Portugal's main port where he spent the rest of the winter tuning in to the thoughts of the sailors on the many vessels anchored in the river.

What he learned so appalled him that he decided to pay another personal visit to the Controller.

Arriving rather cautiously as usual, BG downloaded his edited data and hovered well out of range while the Controller checked it carefully. They completed three polar orbits and were coincidentally somewhere over India before the Controller began thinking openly.

"This is getting beyond our control. Your report about the territorial dispute between Portugal and Spain is bad enough but these latest thoughts collected from all those sailors is terrible. We are quite definitely programmed to avoid causing loss of life. I have been thinking in on that bunch of pirates that your friend the Admiral left behind on Hispaniola each time I pass over. They are actually killing the friendly Indians and eating them. When they are not fighting each other that is..."

The Controller was thinking in a confused manner and BG could not pick up the rest. Very unusual, so still remaining out of grab reach he tried to be helpful.

"We have not caused any deaths, even though I have come close to doing so by mistake a few times."

BG remembered how close he came to giving that grass-skirted club wielder a lethal zap.

The Controller remained thought silent so BG continued.

"It's not us doing the killing, and as they are so dangerous a few less would be helpful surely?"

The Controller gave no indication it was in receiving mode and BG, concerned, moved in closer to look at it through a viewing port. Once again he got too close to the grab arm before he had prepared himself properly for the shock of being sucked into a small opening at high speed. After 2,000 years of accumulated experience, BG really should have been more careful.

BG emerged from the external replicator to discover, as usual, that he still only had one leg. He also discovered that he was a lot larger than a Canary. Not as large as an Ostrich, but big.

"What am I supposed to be this time?" he thought to the Controller who probably had no idea either. But he was wrong.

"You, BG are a Secretary Bird. Those nice long feathers on each side of your head represent writing implements, hence your name."

"Do I have any special orders, or can I just dash off to start writing books?" BG was becoming something of a comedian, but his wit was lost on the Controller; or was it?

"Yes, you are to travel to Poland where you will contact a troublemaker by the name of Copernicus."

"But it must still be wintertime in Poland, with snow and ice everywhere. Standing on one foot is going to be tricky. Couldn't you try to make another leg separately and stick it on?"

"I felt sorry for you and kept you in the replicator while Little Stalk and I went back to the Moon for a few years rest. It's summer time now in Poland so you will be fine. By the way, real Secretary Birds are snake eaters and are not normally found in Poland so mind no one thinks you are a witch and tries to burn you alive."

BG was already on his way when he picked up a final thought from the Controller. Something about becoming a real secretary.

10
1543-1566

When BG arrived in the Polish town of Frombork in the summer of 1543 and perched on the top of a church roof in order to get his bearings, he could quite understand why Secretary Birds were not normally seen in the area. A strong northeast wind was blowing in from the Baltic Sea, and if this was summer, what was winter like? BG had never previously visited anywhere on the planet's surface that was so far north.

Another reason for an absence of Secretary Birds was an equal absence of their favourite diet, large numbers of nice juicy snakes.

But he at once felt at home, a feeling he had not experienced since his first visit to Alexandria. As robots did not normally feel anything, this was odd. As he peered about him another large bird, almost as large as himself and somehow familiar, glided past and landed neatly on a huge nest built on the top of a nearby roof. It was a stork, a real one.

Hurriedly accessing his data bank he discovered that some Storks spent their summers even further north than Frombork and still flew all the way back to Africa for the winter. Very sensible, but a long way to fly. BG remembered that the storks he had met up with at the very beginning of his mission over 2,000 years ago had been on their way north at the time.

Unlike his experiences with Zacuto, BG had no difficulty in tuning in to the thought waves of Copernicus even from his position on the church roof. The Controller had certainly programmed his navigation system perfectly yet again. The man he had to contact was working directly under his foot. Better still, his mind was so receptive that BG could conduct two way thought conversations without Copernicus realising he was communicating with a robot bird on his roof.

The poor man actually thought he was communicating with himself. He would think something, BG would think reply and Copernicus would quite definitely think he had talked to himself and given himself the answer to his own question. When BG requested an explanation, Copernicus would think he had asked it himself!

Puzzled that he had asked a question he already knew the answer to, he still replied; often twice.

"This is going to be easy," thought BG very quietly to himself.

Copernicus had been a priest all his life. Not an ordinary one, but a rather special inquisitive one. He had travelled across most of Europe and studied at three different Universities. He had learned to read and write Latin and Greek and was a qualified doctor, mathematician and astronomer. Like many scientists of his time he also dabbled in astrology, the art of trying to forecast the future from the positions of the stars and planets.

He had paid a long visit to the Vatican library in the city of Rome, where he had read the Latin translation of Ptolemy's Almagest and unearthed some old documents written in Greek that had been saved from the ancient library of Alexandria. The Greek texts, which mentioned the work of the astronomer Aristarchus, gave him some ideas. He took notes at the time and then spent most of the next 20 years thinking about the old Aristarchus "Sun at the centre" idea.

The more the priest thought about the Aristarchus explanation, the more sense it made. But dare he discuss it, let alone publish the idea? People had been beheaded or set on fire for suggesting that the Earth was not at the centre of the Universe. Despite the dangers he decided to consult some publishers.

When BG accessed these thoughts he realised the Controller must have already known about them somehow. Why else warn him personally about the dangers of being burned as a witch? Should he frighten the publishers off somehow?

But when Copernicus did talk to publishers, the reply was always the same. "The Sun at the centre of the Universe? Nonsense, that was the Earth's place." "The Earth going round the Sun once a year, spinning daily on a tilted axis? Also nonsense. Where was the strong wind?" "All the planets orbiting the Sun; no, they orbited the Earth." "The stars far far away? Rubbish, they were all just beyond the planet Saturn". And so on.

Actually the publishers were frightened of the consequences of printing a book that the authorities might consider dangerous to their religious beliefs. They would be as in much trouble as the author.

Then one day BG discovered that Copernicus had found a willing publisher at last and was, even now hard at work finalising his notes.

With the new printing methods, hundreds of copies would be circulated. But should BG bother to try to prevent the publication? The theory was not really correct because Copernicus believed in the Ptolemy idea of perfection. All the heavenly bodies moved in a series of perfect circles, which of course they did not.

The Secretary Bird perched on the church roof in contemplation. One obvious answer was to persuade Copernicus to publish his book in a fanfare of publicity and then sit back while he was beheaded and his books burned. But his programming forbade taking of life, so he thought some more.

What was that last thought transmission he received from the Controller before being abandoned as a snake charmer? BG had to check his data recorder carefully but still could not pick up the full transmission. Something about being a real secretary.

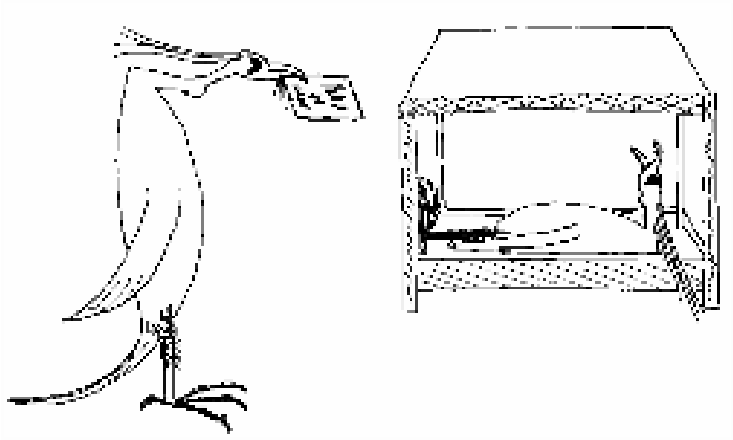
"That's it," BG thought very quietly, *"I'll be a secretary. I'll make a few alterations to Copernicus's notes that will make the book so complicated that it will be unreadable."*

When BG moved into the writing room and balanced very cautiously on the back of a chair he was gambling on the old monk with a peculiar shaved central part to his head recognising him as the one-legged Bird God mentioned by Ptolemy. Actually one-legged upright black and white Secretary Birds do look a little like one-legged stooped Eagles with faded pink plumage and wicked curved beaks from a great distance in a poor light. As Ptolemy's description had also lost a little in the translation, and one version mentioned his second guise as a rolling eyeball Ostrich, he was welcomed like a long lost brother.

But as usual, BG's idea did not work quite according to plan. Copernicus had already completed the document, which ran to several hundred pages of scribble and mathematical arguments so complex not even BG could make head or tail of much of it. There was certainly no need to alter more than a few calculations. Although some of it was actually correct, it would take a genius with years of spare time to work out that all the rolling eyeball orbit nonsense was wrong.

So the scribbled manuscript was sent to the publisher who panicked at the last minute, not wanting to be burned to a frazzle. He added a note in the book stating that the whole thing was only an idea to simplify mathematical calculations and had nothing to do with real astronomy. This kept the publisher alive. Copernicus was not so lucky; he had caught a fever.

The first copy, hot off the press, was delivered to him as he lay on his deathbed. BG standing dutifully nearby as any personal secretary would do, realised that the poor man was thinking a last thought to him. *"Would you see that my hand-written manuscript is torn up please. It is such a scribble anyway."* With that thought, he died, leaving BG with another of his double vision short-circuits.



On the top of a page of the manuscript was a scrawled note in Copernicus's own handwriting that had somehow previously escaped BG's attention. This acknowledged that the great new Copernican theory of the Universe was really an updating of Aristarchus's 1,800 year-old idea, with Ptolemy's rolling circles added.

Yet there was no such acknowledgement to Aristarchus in the printed book. No wonder the cunning old man had wanted his hand- written manuscript destroyed. However BG realised that if anyone discovered Copernicus had simply based his theory on someone else's old scientific work without saying so, possibly no one would ever bother to study the book carefully. So BG, rather than destroy the manuscript, left it in a prominent position on a table, where later it was indeed discovered. It still exists, and no one paid any attention to Copernicus's book for years and years.

The robot Secretary Bird, having completed his mission, was recalled to the orbiting spacecraft for a thorough debriefing.
"You seemed to have done a good secretarial job in leaving clues to let people know he stole the whole idea from that ancient Greek. Good work, for a change." The Controller was thinking in an unusually generous manner.

BG became suddenly wary. The Controller was obviously about to think something that would not be to BG's advantage; he was right.
"I've been thinking. While I remain in polar orbit watching out for any dangerous new developments, you can do a bit of research and possibly save a few human lives at the same time."

BG moved even further out of range. *"I thought you could not stay in orbit indefinitely?"*
"That was before the major overhaul. Don't you want to receive your new instructions? Come a bit closer, I don't want any mistakes in your thought orders."

BG stayed out of range. *"Life preserving? That's not part of our mission; you know that. What are you up to? In any case I'm not properly equipped to stand between two armies waving my wings about and thinking peaceful thoughts. Have you seen those primitive cannons they use?*

"If you would come closer the replicator could make you cannon ball proof." The Controller was joking; he had no intention of trying to stop wars or specifically save lives, but the two robots inside the spacecraft were both finding these alarmed thoughts of BG highly amusing.
"No," and BG moved so far from the spacecraft that Little Stalk lost sight of him.

"Oh come back you stupid bird, I just want you to do a small job on the new continent you helped Columbus find."
BG was now seriously worried. *"Columbus didn't find any new continent. You know that."*

"A slip of the mind, and he did bump into it in the end, even if other Europeans got there first. It's those others I want you to visit. They seem to be murdering thousands of people in South America; all the way across to the Pacific Ocean"

"The Pacific; America? Where did these names come from? I thought they were still calling the new continent the West Indies.

Why America?" "Oh someone called Amerigo Vespucci signed his name

"Amerigo" on a map he had drawn of the new lands and someone else thought it was the name of the land. As for naming the greatest ocean on this planet the Pacific, it was because the first Spaniard to cross Central America, saw it on a calm day"

BG had by now lost track of the mission's new aim, and had become confused, just as the Controller had intended. He let himself drift within range by mistake and was sucked into the replicator.

All three robots were surprised by the new image of BG which emerged. The Controller realised that the old image had somehow been updated rather than changed.

BG was still a Secretary Bird but was now sporting a curtain of knotted string held in place by a hat. BG assumed his eyesight had been damaged and Little Stalk could only see the hat from its poor vantage point behind the star-plotting unit.

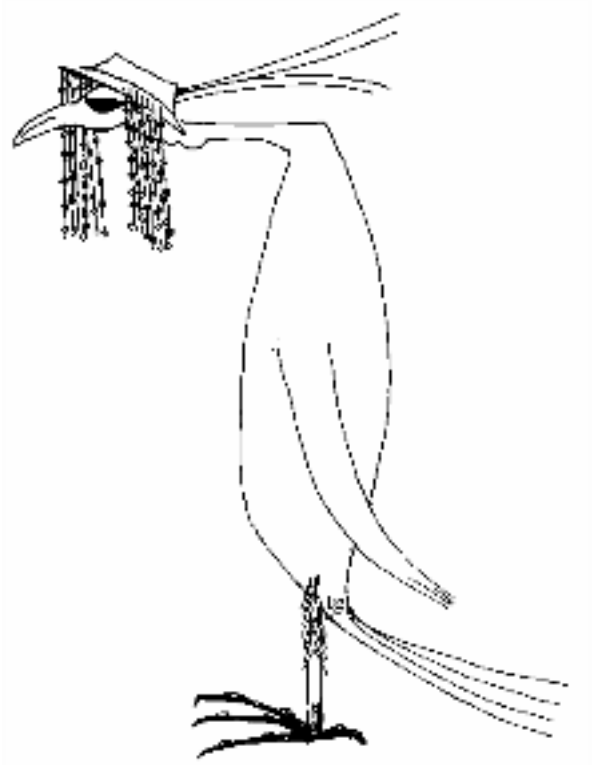
But the Controller was even more surprised when he realised exactly what the string curtain represented. How had the replicator produced this aid to the next mission when the Controller had only just thought it?

"So what am I this time and why are all these bits of string hanging over my eyes?" BG shook his head about but the new head-dress seemed to be stuck in place.

The Controller, noting that the hat and string curtain were not in danger of coming loose, decided to provide a partial explanation.

"Go to South America and encourage the Spanish robbers to destroy all the Quipus while at the same time do your best to prevent them killing all the natives."

"You are still not answering my thoughts and what are Quipus and why should they all be destroyed?"



"My programming will not let me transmit everything, it is having a conflict. Quipus are lengths of coloured string with knots tied in them. The South American Inca nation has never developed a written language and all their history, science and even their tax returns are recorded on these bunches of string. Millions and millions of bunches. Apart from not having a written language they are clever people."

"Must be absolutely brilliant string makers," thought BG who than realised what the string curtain was. *"So I'm now wearing a curtain of machine-made Quipus which are somehow supposed to aid my mission? How am I to encourage the Spanish to destroy all the Quipus when I have a bunch on my head?"*

"Keep those thoughts to yourself and pay attention! The Inca people know as much about astronomy and navigation as the Europeans but it is all recorded on these strings; times of eclipses, comets, full moons, the lot. The different colours in the bunch and the positions of the knots on each string tell a story.

If all these are destroyed, no one can discover their navigational or astronomical discoveries. Think carefully."

BG did. *"It must be difficult to interpret these Quipus. Have the Spanish mastered the art?"*
"No,"
"Millions and millions of bunches? How can anyone, even me, be sure they have all been destroyed?"
"Quite."
"It seems a particularly complicated language. Can the Incas read these Quipus easily? "
"No." "Someone must be able to; who?

The Controller did not think any reply and BG realised why almost immediately.

"Programme in the co-ordinates and I will be on my way."

Only as he entered the Earth's atmosphere did he remember he should have thought the Controller to interpret the meaning of his own bunch of Quipus.

BG found himself over a partially destroyed village build on the top of a jagged peak of rock high in the Andes mountains of South America. Circling carefully and flicking his head from side to side to clear his eyesight of knots, he detected no sign of thinking life. Wrong co-ordinates presumably.

But everywhere he travelled he saw the same scenes of desolation. Burned villages, a few dead bodies here and there, which were often being picked over by huge ugly birds. BG tried communicating with these scavengers but could obtain no responses.

Eventually, he came across a small group of heavily armed Spanish soldiers on horseback and, by eavesdropping on their thoughts, discovered that they were on a search and kill mission. He gathered they were having no luck.

BG then spent ages searching the high interior of South America for proper evidence of the Inca humans. He came across scattered little groups of frightened people from time to time, usually living in huts or in the remains of destroyed buildings. Hardly members of an intelligent race of people though. But he did manage to infiltrate their

thoughts, all the while keeping a safe distance. Without exception they were frightened of the Spanish soldiers. Everyone had witnessed the murder of a friend by these warriors from across the ocean riding strange animals and who were only interested in stealing gold and anything else they thought might make them rich. Although there were a few thoughts of Quipus, none provided any useful information.

BG's current mission was not going well and at one point he began seriously to consider the thought that the Spanish had already done his job for him.

This thought unfortunately coincided with a passing orbit of the spacecraft and was picked up by the Controller. BG was given new co-ordinates in a brief but very clear transmission burst.

He was directed to a deep valley, where he discovered several hundred Incas, all living in a series of caves cut into the soft rock in the valley side above a fast flowing river.

He perched warily in a high tree and began to tune in to the general thoughts. This was not a happy place and all the people were frightened, but at least here there were leaders. People he could communicate with, who would surely be able to aid his mission. But he remained in the tree. These people were hungry and BG had already witnessed the killing of several small animals and had no wish to be shot at. Apparently they were using powerful cross-bows captured from the Spanish and a strange bird with a head-dress of Quipus was certain to prove a tempting target.

One day a small band of weary travellers trudged into the valley and were welcomed, not like friends but as important people.

The robot Secretary Bird felt his frame tingling. Here were intelligent thinkers, the air seemed alive with a criss-cross of communications and BG at once received the clues he had for so long been searching.

The main building in the capital city that had held all the government's records had been burned to the ground years ago by the Spanish. Everyone knew this but only with the arrival of the important officials did anyone bother to talk or think about it. Not only had the building and most of the records been destroyed, but the official recorders had been put to death.

"Why?" BG managed to put his thought question to the most receptive of the newcomers who spoke an answer, thinking a local had asked him.

"The invaders from across the small sea were searching for gold and when they failed to find any, they burned the whole building to make us tell them where it was. Then they started killing us, one by one. There were only two of us left alive and then my friend told them while I escaped. So they took the gold and then killed him too. When the murderers had left, I searched among the ruins and discovered that some of our national records had survived in a corner where the roof had collapsed. So I collected these Quipus, wrapped them in skins and with the help of the few surviving elders, have brought them here."

BG realised the man posed no danger and flew across to a nearby rock. He shook back his head, hoping the head-dress would flick back over his head and be mistaken for feathers. He need not have bothered. The man stared at him, tried to identify the Quipus and began laughing.

"Why, what do they say?" thought BG, not at all sure he would receive a reply.

"They don't say anything," thought the man, *"they are not Quipus; probably part of an old fly screen. How did they come to be stuck on your head."*

At least BG was in communication. Ignoring the question, BG came back to the point which was concerning him. *"You mentioned the invaders from across the small sea?"*

"Oh yes, from across the sea from where the Sun rises, not the great one."

"How do you know the other sea is the great one?"

"We have sent ships across it, that's why.

" BG thought so rapidly the man never picked anything up. *"If they know one is bigger than the other they must have sailed across both, and managed to return, yet I have never received any mention of ships or seen any evidence of any. Odd."* BG reverted to slow thought mode. *"You have sailed across these seas?"*

"Of course not, but our ancestors did, hundreds of years ago. In big ships made from the great trees that float. Not many returned but a few did. That is how we know."

BG did some more rapid thinking. *"They must have sailed right across to Africa to know the Atlantic is smaller than the Pacific. I wonder when they did that?"*

Slowly BG thought *"Did your ancestors reach the great land to the east where the Sun rises?"*

"Nothing has been recorded about that."

"How do you know it is a smaller sea than the other one then?" BG was pleased with himself; the man was clearly only repeating some story he had picked up. Probably none of which was true. But the answer came as a complete surprise.

"Our records show that the great sea is so huge that there is not room on the Earth for the other one to be as big. So we called it the small sea, because it obviously is."

BG began to get the feeling that this conversation was heading in a similar direction to the one with the Controller that had started his South American venture.

"You know how big your Earth is?"

"More or less, but it is not my speciality. You would have to ask one of our astronomers or navigators. I'm only a recorder." Then the man's thoughts turned to his friends. *"But sadly they are all dead, but in any case the days of our great achievements are long past. Our history is recorded on the Quipus, but many of these have already been destroyed by the invaders."*

"How many recorders are left. How many of you can record on the coloured strings or read them?"

"I am the last."

BG was just wondering how to destroy the Quipus that had been stored in the caves in case they really did carry information important to the mission, or better still how to get rid of the last interpreter without loss of life, when pandemonium broke out.

From both sides of the valley huge rocks started falling. At the same time men on horses sealed off the escape route along the river and began firing at the Incas.

Whilst the Great Bird God was deciding what, if anything to do, a stray crossbow bolt hit him under the wing pit. Being an advanced robot, he shot vertically into the air instead of crashing into the river, but he was not amused.

Before he could stop himself, a brief, non-fatal charge of electric current had flashed down and hit the threatening Spaniard full in the chest. Unfortunately the charge struck the soldier's metal breast-plate which increased the effect and killed him and his horse. But not before the soldier's second shot had stuck the poor recorder an equally mortal blow.

BG, his work done for him, and now also in conflict over his unfortunate taking of life, rapidly retired to the safety of the nearest mountain top and waited for the next suitable orbit of the spacecraft. He had a lot to report and with a fly screen and hat stuck on his head and the crossbow bolt firmly lodged in a very inconvenient place, he would certainly have to face that replicator again.

11
1566 - 1601

When the spacecraft next came within transmitting range, BG lost no time in performing a rapid download, starting with a brief but optimistic *"mission successful"* thought. But long before he had reached the point at which he was to send his extensive damage report, his thinking was broken into.

"No time for the rest of the data, I'm programming you with new co-ordinates." The Controller was clearly in a hurry and BG wondered if he could get to his new location in his damaged condition, but there was worse news to come.

"Get there immediately and stop a young hothead from being killed in a duel. We need him."

The spacecraft sped on out of thought range before there was time even to give BG a description of the person he was supposed to save, or why he was so desperately needed.

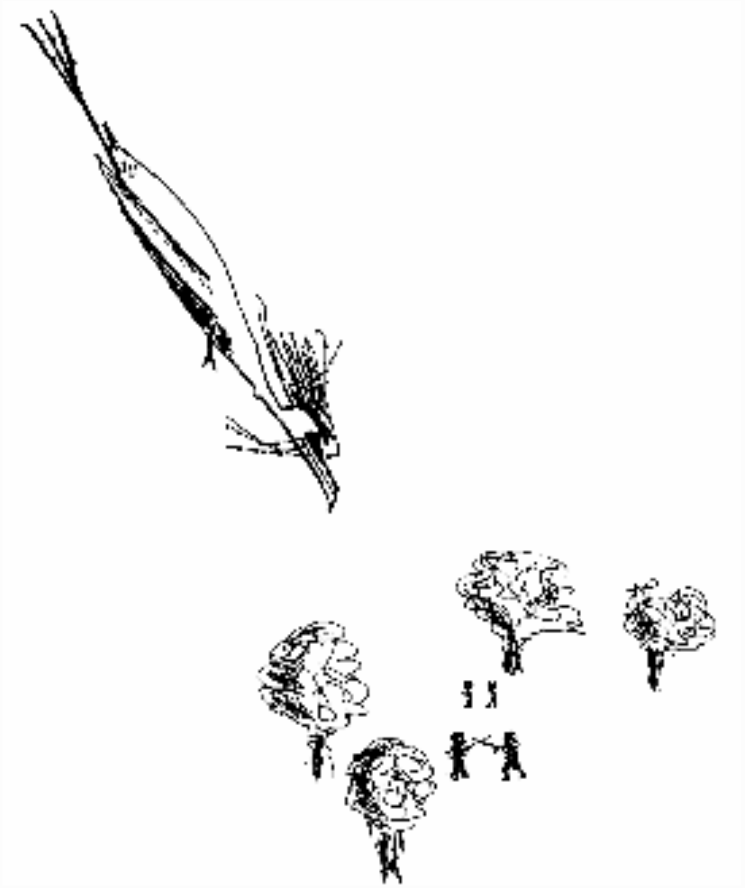
But being a loyal robot, he did as instructed even though it took much longer to get to Denmark from Peru than it normally would have done. BG had a tiny fuel leak which was staining the feather covering under a wing pit and the crossbow bolt was causing airflow and stability problems. All in all BG was not in either good condition or a good mood when he arrived in a park just as dawn was breaking.

There right in front of him were two young men, stripped to the waist and slashing at each other with duelling swords. Not the pointed sort but ones which have very sharp edges. To one side stood two other young men wearing dark cloaks and who gave the impression of wanting to be somewhere else.

As far as BG could see, which was not as much as normal owing to the fly-screen, the duel had only just started because neither appeared to have received any injuries. That would certainly soon change, even though it was quite obvious that neither duelist knew anything about swordsman-ship.

BG had no time to discover which of these two madmen was the one he was supposed to save. He was also unwilling to use his lightning zapping technique after the last unfortunate accident involving a

metal object back in South America such a short while ago. Despite yet another bout of double vision, which converted both duelists into a couple of one-legged Secretary Birds with fly-screens in his data imaging system, BG did not hesitate.



As one of the duelists lashed out wildly, BG flashed between them and his body absorbed most of the blow, a blow that would otherwise have taken the other novice swordsman's head off for certain. But because BG's reactions were slower than normal, the sword was not completely blocked and it slid off his metal casing and neatly sliced the end off the other man's nose.

Utter chaos followed. There was blood everywhere, most of which seemed to be covering BG's feathers. The watching men rushed forward to stop the fight. Blood had been spilt and so honour was satisfied on both sides.

One man had dropped his sword and was holding the tattered remnants of his nose. The other was poking BG with the point of his weapon, possibly thinking he had killed a large bird that had got in the way by mistake, and secretly pleased it had. Killing an opponent in a duel would not have been a gentlemanly thing to do.

Before he had the chance to discover if this blood-covered bird really was dead, BG once again shot up into the sky, now most certainly very much in need of a service.

"So would you mind letting me know what all that was about. This mission is becoming dangerous." A badly damaged and half-blind BG was drifting near the spacecraft in full view of the two on-board robots. The Controller, having downloaded BG's latest information, was in a generous frame of mind and did not mind in the least although how the replicator had produced a fly-screen was still puzzling it.

"That Quipu case was wonderfully solved. Quite brilliant the way you took your time over saving that last little recorder. Just enough to let him be killed. Of course, I couldn't instruct you to do that, what with our being programmed to save life, but you thought between the lines and carried it out. Then the way you zapped that Spaniard; serves him right." But the Controller was indignantly interrupted by BG who was now agitatedly flapping dangerously close to the long-range thought antenna.

"Nonsense, and you know it. Check the data," BG furiously thought, *"I carried out my orders strictly according to my programming."*

"If you think so. But you cut it fine with that Tycho Brahe astronomer maniac. Lucky for you he only lost his nose."

BG realised for the first time that he had saved the right man, not that he understood why Brahe's life was important to the mission, but he was still not pleased with the Controller.

"Lucky? That was a very skilful intervention considering my condition." But as BG continued to flap, the fly-screen fell right over his eyes and the crossbow bolt, still protruding from his wing pit, became tangled with the antenna. While BG was struggling to get loose, the external grab seized his foot and a bloodstained BG found himself being taken in for his long needed service.

The spacecraft returned yet again to the surface of the Moon for repairs. These took longer than usual owing to the unfortunate fact that the replicator found the crossbow bolt difficult to digest, it being manufactured from non-standard materials.

The Controller eventually took the craft back into its polar orbit and for many years carried out regular thought checks on the activities of navigators and astronomers, Tycho Brahe in particular. Eventually the time came when the Controller required the services of the Bird God once more and the replicator disgorged the latest version.

"And just what am I supposed to be this time?" BG, despite being widely travelled was not at all sure. Even his newly serviced data-bank was having trouble identifying the species of bird he had just been turned into. He was so fat he could not see if he had any feet at all and although his vision was no longer hampered by a fly-screen, his imagery software had still not been corrected.

"You're a Penguin. An Emperor's Penguin; without a hat or a hair-net. They normally live near the south pole of this planet. I thought you would be pleased. No one will notice you only have one leg; it's covered by the fat folds of your stomach anyway. By the way, sorry about that again. I thought I had fixed the replicator but your crossbow bolt messed it all up. I spent a long time working on your behalf you know."

"But presumably I still have large eyes, a large beak and a large foot?"

"Only slightly large, but I will get it right eventually.

" BG doubted it. *"Where am I going this time, an iceberg? "Of course not, you're going back to visit Tycho Brahe, he owes you a favour and he is in a spot of trouble again."*

Registering BG's thoughts on this, the Controller hastily added *"The Earth year is 1601; you have been resting. It's now 35 years since he lost his nose. He has not been in any more fights since you saved him."* As usual the Controller was being slightly economical with the truth.

"What's so special about this man? You never thought me why last time."

"Just do as ordered." The Controller was not sure why it's computers were targeting Brahe either. BG, sensing this continued to protest.

"Are you seriously expecting me to go to Denmark and save a man who I have already saved once when I'm dressed as a Penguin from the South Pole? I bet no one in Denmark has ever seen a Penguin!"

"Wrong on both thoughts. You are not going to Denmark but to Prague, and there you will discover that lots of people do know what a Penguin looks like." This time the Controller was being even more economical with the truth than usual, as BG would soon discover.

Thus it came about that an overlarge Penguin was seen hopping up the steps of a town house in Prague, capital of the great Austro-Hungarian Empire. Having absolutely no idea why he was standing on the top step, BG pecked noisily at the front door with his large beak for want of anything better to do. People walking along the street stopped and stared and before long a crowd had gathered. Some thought it was a child in fancy dress but one woman actually recognised BG for what he was supposed to be.

"That's a Penguin bird," she shouted and, just as BG turned in surprise, the door opened and there was an old whiskered version of the young man BG had saved from death all those years ago; Tycho Brahe. The astronomer's gaze flitted between the apparition on his doorstep and the crowd.

"Madam, how do you know this creature is a Penguin bird?"

"My husband sailed to South Africa sir, and he brought back a Penguin bird skin as a trophy. I have it still." She walked up the steps and pulled at one of BG's flippers. Standing on the step below BG they stood shoulder to shoulder. "But either this one is a giant or our skin has shrunk."

BG snatched his flipper back and thought strongly but without too much conviction because he was inventing the story as he went along, *"I'm an Emperor's Penguin, they are very big and special, and don't keep pulling me about."*

The woman, wondering where the thought had come from, stepped back in surprise and fell down the steps. Brahe, on the other hand, bowed low and with a sweep of an arm, ushered BG into his house.

The Emperor's Penguin Bird God hopped carefully into Brahe's book-lined study and set about putting his host in the thought picture.

"I'm a different version of the bird that saved your life when you were fighting that silly duel."

Although Brahe had registered that BG was claiming he was an Emperor's Penguin, this new thought almost convinced him he must be having some sort of bad dream. He tapped the side of his head to make sure he was not sleeping and then looked closely at BG, who stared back because he knew that Tycho Brahe was only 54 years old, yet he was fat, unfit and appeared ancient. His great mass of whiskers hid most of the metal plate covering the place where his nose had been.

"Go on, think up a question to test me!" Still not knowing why he had been directed to Brahe, BG was seeking clues.

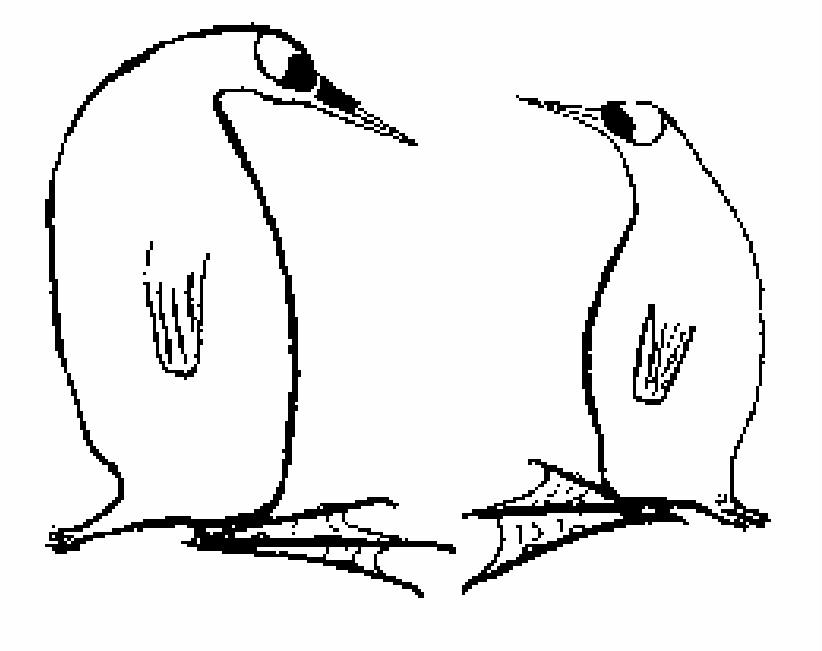
Brahe, not too happy about recalling that dreadful occasion, spoke and thought two different things at the same time. "No one saved me. I would have won if a shot Stork had not fallen from the sky," was what he found himself saying, but at the same time he was thinking *"I wonder if this really can be the same bird that saved me? Surely not."*

"I was actually a one-legged Secretary Bird wearing a Quipu head-dress outfit at the time, not a Stork. I deliberately put myself in the way of a sword that would otherwise have killed you. You were not about to win anything, you were about to die. And the blood from your severed nose drenched my feathers." BG was not amused.

Brahe registered the thought rebuke quite clearly but was still not convinced. But at least this time he simply thought his reply. If his assistant came into the room he would think him mad if he saw him talking to a bird.

"I'm now Emperor Rudolf's famous Imperial Mathematician and so everyone knows that story, you could have picked it up anywhere. Provide me with some real evidence and I may believe you."

BG tried to think of something that would convince this man, at the same time providing a clue as to his mission. Logical thought was being hampered by the return of his double-vision and his preoccupation with the man's metal nose piece.



The thought of giving him a mild zap in a leg well away from his metal nose crossed his mind. He was tempted, but then he suddenly experienced another of his brainwaves.

"I'm an Emperor's Penguin, and Emperor's Penguins are named after Emperors for one very good reason. They all have instant thought access to every Emperor on Earth. Would you like me to think communicate with Emperor Rudolph that I bravely saved his Imperial Mathematician from death who then ran away like a coward leaving me badly injured?"

Brahe decided not to insist on any more evidence. He did not need to communicate this climb-down. The Penguin Bird God could read his mind.

On reviewing this mission, BG decided he was getting nowhere. Why had the crafty Controller given him the title "Emperor's? He decided to ask it. But just as the fat Penguin was trying to prepare his communication link, another man strode into the room.

Brahe said nothing, still mindful of being observed talking to a large Penguin, silently thought introduced his assistant, all the while staring at a table. BG gathered the young man's name was Johannes Kepler, he was 29 years of age and he was helping with the backlog of work on double-checking on the orbit of the planet Mars.

"The orbit of Mars?" thought BG but Brahe, who was still staring at the table did not appear receptive. BG concluded that the old injury to the front of Brahe's skull had permanently damaged his brain. But surprisingly Kepler picked up the thought and replied likewise.

"Yes, but it's very complicated."

At long last BG had discovered the reason for being sent to this house. He cancelled his planned transmission to the Controller and thought very very very quietly *"So it was Kepler, not Brahe I was sent to deal with. He will surely be easier to manipulate."*

But, as had so often happened in the past, BG was wrong yet again.

12
1601 – 1642

With a large Penguin as well as Johannes Kepler now in permanent residence in his house, Brahe became more and more agitated. The heavily bearded scientist was showing signs of mental stress and spent much of his time in bed while his assistant did most of the work.

Brahe had employed the out of work mathematician to sift through the planetary measurements he had taken over the years but he had soon realised that Kepler was no ordinary bean counter and seemed to know more about some aspects of astronomy than he did.

Then there was that blasted one-legged Penguin thing, never talking and very polite in those of its thoughts he could pick up. What was it up to?

Because of BG's presence Brahe's past repeatedly came back to haunt him. He surely would have killed that fool in the duel if he had been a better swordsman. But then he might have been branded as a murderer. If only he had not lost his nose, he would have been better respected. In his more confident moments these worries could be forgotten, but at night, when he could not sleep, they all came rushing back.

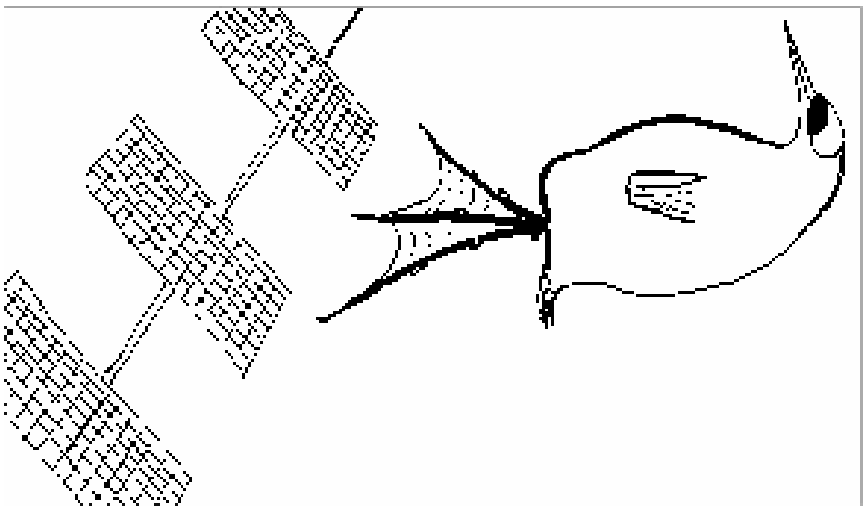
One night they all rushed back at the same time and he died of a heart attack just after he had decided to ask the fat penguin what a Quipu head-dress was.

Emperor Rudolph wasted no time in appointing Kepler as his next Imperial Mathematician but at a very low salary, which he avoided paying most of the time. Kepler, despite poor eyesight and shaky hands persisted with his nightly observations of the planet Mars. BG, not wishing to encourage this line of research because he already knew the likely outcome, did his best to distract Kepler. But apart from mixing up papers there really was not much he could do.

BG had discovered that Kepler was from a poor family and had been forced to leave his wife with their children in a distant part of the Empire to search for work. Two of their children had already died and his wife was never well. BG's programming would not permit him to make further trouble for such a person without clear instructions from the Controller.

BG could put off his next visit to the spacecraft no longer. In any case zooming about a bit would be a good way to stretch his leg.

The large portly robot Penguin drifted near the spacecraft while both the Controller and Little Stalk peered through viewing ports in wonder. BG was spinning very slowly tail over head while flapping his massive webbed foot up and down like a fan.



"Very impressive. Now, when you have finished showing off, perhaps you would care to download your data?" The Controller wedged the miniature version of the fat Penguin behind the star-plotting unit and prepared to collect BG's reports.

BG's foot brushed lightly against the end of a solar panel during one of its flaps and sent the entire spacecraft into a gentle spin. Little Stalk banged its head and the Controller flicked the wrong stabiliser switch.

"I suppose you think that was funny. You are picking up bad habits down there. Suppose you explain your problem while I'm clearing up the mess. Start thinking."

BG explained that he could not disrupt Kepler's research into the elliptical orbit of Mars without endangering life and concluded with, what was for a minor robot, a risky demand. *"Clear instructions please, and no sneaky tricks."*

The Controller left BG still spinning slowly end over end while it studied his report. It soon realised there was going to be no easy answer to this one.

"Stop flipping over and over and come alongside the grab."

BG had never received such a commanding thought. The Controller really was serious this time.

The fat robot Penguin did exactly as instructed without a single objecting thought. The grab grabbed him and the replicator did its work. Out came a medium-size white bird with only one leg and a particularly large foot on the bottom end of it as usual. From what he could see of himself BG appeared to be a Dove.

"How does Little Stalk like being some sort of Dove?"

The Controller realised that, in the confusion, the miniature Penguin version had not been trashed. Preferring to spend time in cramped quarters with a tiny Dove rather than a fat Penguin, the Controller snatched Little Stalk and pushed it into the internal replicator without a moment's thought. Surprisingly, out came a bird the Controller was entirely unfamiliar with. The latest data input records from Earth would need to be checked to discover what species Little Stalk now represented. Most certainly it was not a Dove. Meanwhile BG's question would have to be ignored.

"Right, now pay attention. Continue to delay scientific advances in navigation or astronomy, but not if life is in danger. If in doubt, back off. Now that the replicator has taken my advice and converted you into a Dove of Peace you should have no problems avoiding life-threatening situations."

Kepler accepted the new version of BG readily enough. Thought communication was still the same, but having a small Dove in his office was easier to explain to visitors than having to go into endless details of the life history of Emperor's Penguins, all of which he had to invent. The numbers of curious visitors also dropped dramatically which gave him more time to sleep during the day. At night he continued with his observations and was pleased to discover that his paperwork seemed less muddled.

Several years passed before he finally managed to make sense of the Mars data, but when he did, BG knew the mission was in real trouble for the first time in over 2,000 years. To make matters worse, Kepler was about to publish some of his results. BG desperately tried to muddle the proofs but stopped when he discovered that Kepler's wife was very ill.

She was so ill, and Kepler so poor that Kepler could not sleep properly because of the worry. Then he found that he could no longer think properly either. His head was so full of mathematical equations that they no longer made any sense. Then he started having trouble with his measurements of the Mars orbit. He could not hold the angle-measuring instrument steady because his hands were shaking continually and he could not line the sights up with the planet properly because his eye would not focus. All in all, he was a wreck. In fact he was on the verge of a complete mental breakdown, as BG realised.

With those last clear instructions from the Controller firmly held in his data bank, BG had no difficulty in deciding he must help Kepler. So the Dove of Peace set about acting the part.

While Kepler was trying to sleep, BG picked up the confused thoughts, set them in order and thought them back to the man who was tossing and turning in his bed. To be certain, BG also transmitted a few extra measurements which Kepler had forgotten to take and corrected some of the ones that he had made mistakes with. While he perched near the bed, BG was actually feeling pleased with himself as he picked up Kepler's brainwaves which first sorted out the muddle, and then solved the entire problem. Kepler became a changed man within 24 hours.

The mathematician took the details of his discovery to the Emperor who actually gave him some money to send home to his wife and also provided enough cash to pay for the printing of a new book.

In 1609 Kepler published "New Astronomy", the book which explained that Mars moved round the Sun in an egg-shaped orbit, speeding up as it neared its huge mother star, and slowing again as it got further away. While he was at it, his new-found confidence allowed him to think, rightly, that all the other planets, including Earth, did the same.

So much for the ancient belief that all orbits were perfect circles! So much for the stationary Earth at the centre of the Universe!

Students of history, had the old ideas of Aristarchus not been hidden in the Vatican, would have realised that Kepler was really only providing the scientific evidence which confirmed a 1,800 year old theory. But at the time, a white Dove with a missing leg was the only one who knew this. BG was also the only one, apart from the Controller, who knew Kepler was absolutely correct. Even the Controller did not know exactly how this had happened because BG had doctored his report. Doves of Peace were surely allowed to keep some secrets, especially when they had compromised the mission?
But there was still considerable opposition to Kepler's new claim, despite it being backed by firm evidence. The old arguments surfaced once again. If the Earth was spinning, where was the 600 miles an hour constant wind? Then came a new complaint. If the Earth was moving round the Sun at a continually changing speed, why did no one feel this motion?

Just when BG was beginning to hope that Kepler might not be believed after all, a man in Holland far to the north inconveniently invented a spyglass and another, far to the south used it, even more inconveniently to view the giant planet Jupiter.

One day Kepler received a letter. All that was written on the sheet of paper were the following 35 letters:-
REXTICPUDJGMNIOTIEBRLOSINOLOMARUGOF
No signature and no address even.

"What does this mean?" Kepler thought to BG for although he was familiar with secret codes, this one was not in a form he could easily decipher.

"Who is Galileo?" though back BG whose computer had solved the code in a spit-second.

Thinking no reply, Kepler studied the note carefully a second time, jotting down letters one by one. The Emperor's mathematician was no fool.
"Four moons orbiting Jupiter" he thought;*"what a surprise that is."*
But he was thinking to himself; BG had disappeared.

Having called for an urgent meeting, BG was floating near the spacecraft transmitting furiously.
"Why was I not downloaded with up-to-date information? Who is Galileo? How did he manage to observe Jupiter's moons? You know what this means? Our entire miss...." But the Controller broke into BG's transmission.

"Do stop thinking. I was on the point of calling you up for a conference anyway but Little Stalk kept licking instruments and I was distracted. Now think carefully."

BG downloaded the Controller's thoughts and did not interrupt once.

"A Dutchman, Hans Lippershey, recently invented a very primitive telescope, this Galileo man got wind of it, made one of his own and observed Jupiter with it, thinking he might be able to see features on the planet's surface. Actually the telescope is so primitive he can only just see Jupiter, but he did notice the four largest of Jupiter's nine moons. He also realised that if and when anyone can observe and time the orbits of these moons, they can be used as a sort of heavenly clock to determine longitude every time one of them passes behind or in front of Jupiter." The Controller then passed across a lot of technical details and the location of Galileo.

"Now you can think."

"Why did he send a coded message to Kepler?" "You are not thinking logically yet. Kepler is the Imperial Mathematician; honest and very influential. If Lippershey or anyone else with a telescope makes the same discovery, Kepler will confirm Galileo was first."

"Why not publish the details properly?"

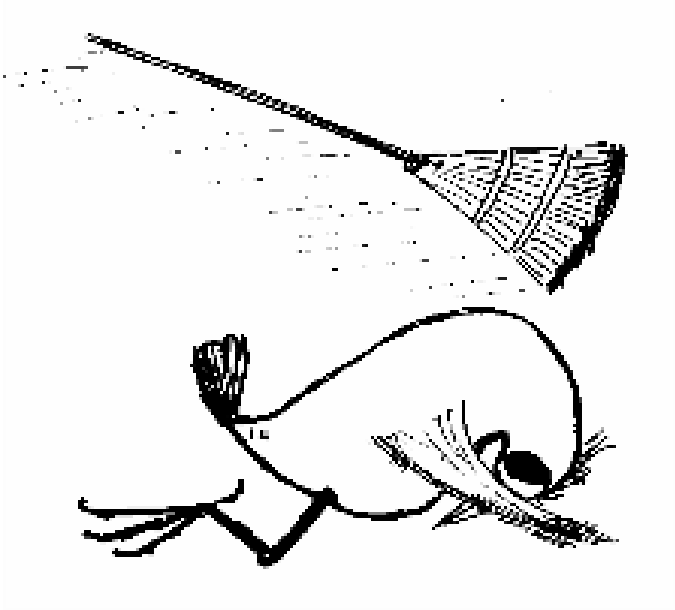
"He has now."

BG, having absorbed the Controller's explanation then thought
"They will need very good telescopes to determine longitude using Jupiter's moons and how can a mariner..."

But the Controller broke in again. *"Just buzz off and confuse Galileo."* BG buzzed off in such a hurry he forgot to enquire how Little Stork was managing to lick things.

When BG reached Italy he flew straight into trouble. Arriving at Galileo's house he was surprised to discover that there was a dovecote in the garden and a small flock of blue and brown Pigeons circling overhead. Rather than join them, he chose to land on one of the outside perches and tried to look in. It reminded him of his meetings with the spacecraft. But whatever was going on inside the dovecote was not producing any thoughts and neither was anything useful coming from the circling birds.

BG took off again using a quick burst from a thruster to get enough vertical lift to clear the dovecote roof and shot across to the main house where he took a chance and flew in through an open window. A mistake. He shot rapidly out again a moment later followed by a broom and some rude words.



He gathered from the thoughts of the housemaid that birds were not permitted in the house. So he perched on the roof and tried to establish thought contact with Galileo from a distance as he had done with others so successfully in the past. This caused further problems because the large Pigeons were not taking kindly to a small white Dove and repeatedly dived at him.

"I'm not having much success on this mission. I'm reacting too peacefully" thought BG when next the spacecraft was overhead, but the Controller was unhelpful.

"Puff yourself up a bit, roll around in the mud and pretend you are an aggressive Pigeon." BG decided to ignore the suggestion and found a less exposed perch.

For several days and nights he perched under the eaves of Galileo's house and although the professor was at home and BG picked up the occasional thought, he was still making no progress. Then a rider on horseback galloped into the yard, obviously with an urgent message.

The message brought in such haste informed Galileo that the Jesuit mathematicians at the Collegiate in Rome had examined his claims. They had indeed observed Jupiter's moons through the telescope provided by the professor but this did not mean that he was right. The Earth was stationary at the centre of the Universe, as it always had been and would always remain. They regretted that Galileo should have for one moment thought otherwise and they were passing their complaint to the dreaded Inquisition for a judgment.

The Inquisition was an all-powerful secret society run by the State and the Church, which was used to deal with anyone who disagreed with official policy. Sign a confession or we will pull your legs off. Everyone signed in the end, then what was left of them was usually publicly burnt as an example to others. Clearly from the thoughts BG picked up, Galileo was a very frightened man. He had good cause to be, despite having friends in high places.

One good thing came out of this terrible message. Galileo suddenly began responding regularly to BG's thoughts, although, like Copernicus, he thought he was dreaming them himself.

Still focussed on saving the lives of his scientific contacts, the Dove of Peace gave Galileo several peaceful thoughts of good advice. *"Think calmly. Cultivate even more friends of influence. Use some of your money to buy yourself out of trouble. Admit anything. Don't write anything on paper; even in code. That note to Kepler was foolish."*

Taking what he imagined was his own advice, that is exactly what the professor did, and for a time he was safe.

The Controller, for once keeping BG in the picture, advised him that Kepler had indeed built his own telescope to check on Galileo's discoveries and had confirmed everything.

Together they had jointly solved the entire puzzle of the solar system and established a method of global navigation at the same time.

But then tragedy had struck the Kepler household again. A third child died, aged only seven, Emperor Rudolph abdicated and the new Emperor did not require an Imperial Mathematician. The unemployed Kepler went home and a few months later his wife died.

"Now you can concentrate on confusing Galileo," thought the Controller.

A committee of scientific experts assured the Inquisition that Copernicus, Kepler and Galileo were wrong and the Earth had no motion and was indeed at the very centre of God's Universe. Galileo was ordered not to publish anything more and everyone was informed it would be a criminal offence to be caught reading Copernicus' book. The Inquisition members were unaware that there was a copy in the Vatican library, but as no one could understand what was written in it, it made no difference whether they read it or not.

Over the years, the continual disputes with the Inquisition had damaged Galileo's health and the hours spent peering through poor quality telescope lenses had affected his eyesight; he was going blind. But he was determined to publish the details of all his discoveries before he died so he arranged for a friendly publisher in Holland to print his ideas.

Nothing BG could think to Galileo from a distance could persuade Galileo that this was a dangerously stupid move. Predictably the old man was placed under house arrest the moment the Inquisition discovered he had disobeyed their orders.

Hearing of this, the Dutch decided to present Galileo with a gold chain but he was not allowed to travel to Holland to collect it. They sent it to his villa, but he refused to accept any award while under house arrest. Very ill and now almost completely blind, the obstinate old man climbed painfully into bed and died.

The one-legged white Dove of Peace had completed another failed mission, this time without even coming face to face with his contact. These failures were becoming a habit and BG wondered what the Controller would think this time.

But although Jupiter's moons would prove useful in determining longitude on dry land for defining country boundaries and for map making, the system would not work at sea as BG had thought to the Controller years ago.

A ship's captain needed to know his position regularly and with some degree of accuracy. Jupiter was often not visible and even when it was, locating the positions of the tiny moons was usually impossible from the rolling deck of a ship.

13
1642 – 1667

The peaceful white Dove would have preferred to have downloaded his report on his latest failure from a comfortable distance, despite his love of travel. But the Controller insisted on an immediate rendezvous with the spacecraft.

"This report is an absolute disaster. You never even made direct contact with this Galileo man. You seem to have made no effort to divert his thoughts, or to confuse his research. An absolute disaster."

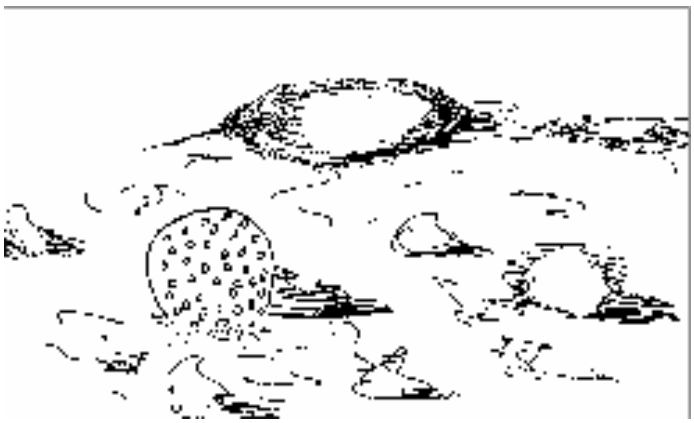
BG understood the Controller was not pleased. Robots were not programmed to repeat their thoughts just to make a point, which meant that the Controller had either become confused or there were two different "absolute disasters" in his report. He decided to think nothing and wait.
"Yes there were two disasters, and I'm not confused."
BG had obviously not been successful in thinking nothing.
"You helped Kepler as well."
BG realised his report doctoring had been spotted but the Controller had not finished.
"I spent a great deal of effort in programming the replicator to change you from a Penguin into a Dove to help you infiltrate the Galileo household."
"Surely you are not thinking me that you can alter the programming of the replicator to produce whatever version of me that suits our mission? In any case my peaceful Dove outfit was useless."

The Controller knew it had gone too far, but before it could reply, BG continued. *"So, produce a new version of me with two legs!"*
"No, you are very effective with just the one."
"I thought I was an absolute disaster?" But BG, being inferior to the Controller, wisely decided not to continue with the discussion.
"Just give me my new instructions and I'll be off."

"In that useless peaceful Dove outfit? Come close and be grabbed. We are all off to the Moon for a rest."

"A rest? On the Moon? Oh good, now I can see it close up."

And so it was that the Controller, Little Stalk and BG went to the Moon for a rest. Unfortunately, BG, being a simple robot keen on travel, had not realised that once inside the replicator and in a temporary jumbled state, he would be in no condition to see what anything looked like when he arrived.



The Controller had intended to set the Great Comet alarm and emerge from stand-by mode in1682. But as was so often happening with these robot-controlled plans, it was not to be.

Sensors on the spacecraft, set to warn the Controller of unusual activity at key mission points on Earth, brought them out of hibernation 16 years early. The City of London was on fire.

The spacecraft was once more placed in polar orbit and the external replicator produced the latest version of BG, complete, of course, with only one leg and a large foot. BG discovered that he had been transformed into he knew not what. The Controller discovered that BG was now an updated version of the latest Little Stalk it had been stuck with ever since it had forgotten to run an internal replicator test before producing the Dove of Peace.

"If you would be so kind, perhaps you could inform me what I am this time?" BG was being extremely polite for once. In all his travels he had never once come across this bird. With his mostly black and white plumage he wondered if he had become another of those mock-up's like the Archimedes Bird with the screw leg or the Heraclides Fat Pretty Bird.

"Where for example is my other claw?"
Looking down BG could only see two instead of the three he could usually see.

Perhaps he was an updated version of that rolling eyeballs Ostrich? But the Controller had done his homework the moment the Little Stalk version had started licking things and trying to drill holes in the long-range star-plotting unit 50 years ago.

"You are a Great Spotted Woodpecker. Your third claw is at the back with the fourth. I think it helps you climb trees. You can use your beak to make holes in wood and you have a very long tongue for some reason I do not yet understand."

The Controller decided to leave Little Stalk in peace; for the moment. But one more hole-drilling attempt and the miniature version would find itself in the trash can!

The reason that London had been included as an area of special interest to the Controller was because for the previous 200 years it had been picking up increasing numbers of thoughts from scientists there. Nothing special and other sites in Europe had taken priority but it was time for BG to take a closer look. When better to start than when London was on fire, just when those threatening the mission would be distracted? It might also teach the Woodpecker a lesson. A few singed feathers would make BG realise just how unpleasant it was to be burned as a witch and might help him concentrate.

So BG was carefully briefed. The English had recently formed a society for scientists, supported by the king. This society met regularly in London to discuss the latest scientific discoveries, many of which involved navigation and astronomy. Some of these people were very clever and needed watching carefully.
"Go down there and do some meddling."

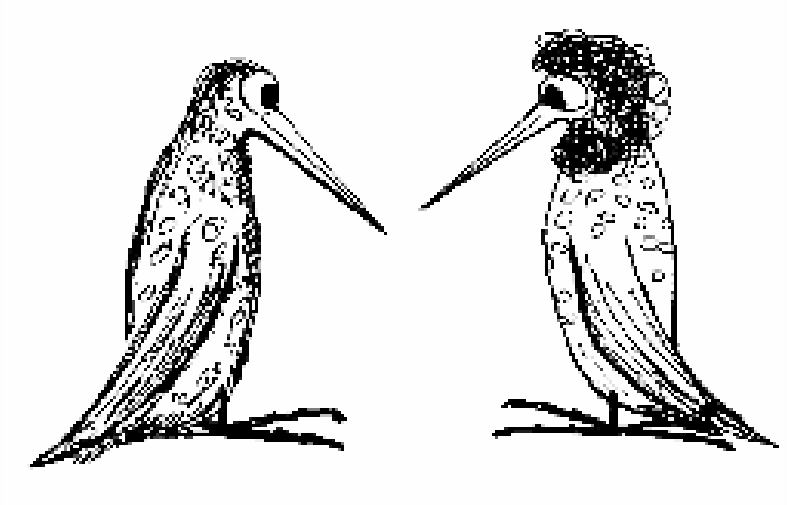
BG went, and he did indeed singe his feathers. This was entirely the Controller's doing. It had deliberately programmed BG with the exact details of his destination, which was the house on the edge of the City of London where the scientists of the Royal Society met to tell each other how clever they were. It was on fire when BG arrived and although he naturally took avoiding action, some of his feather coating became smoke damaged and a couple of feathers had their tips shriveled. Had he been insured he would have had good grounds for claiming for a new coat. But when he hastily requested one from the Controller, all he received in reply were a couple of thoughts his mechanical brain could not comprehend.

When Robert Hooke, the Royal Society's Curator of Experiments, had finished putting the house fire out, he noticed a smoke-grimed Woodpecker with one leg, perched precariously on the courtyard railings. Being a curious scientist, he wondered what a Great Spotted Woodpecker was doing in the middle of London, why it did not appear to be afraid of fire and why it had such a large foot. *"Too much in-breeding?"* he thought to himself.

"Of course not, my Controller is a poor mechanic."

Hooke, a great mound of hair stuck on the top of his head, stared at the Woodpecker from under bushy eyebrows. Had it perhaps spoken? Surely not. *"I must have been working too hard,"* he thought.

"No I don't need to speak, I just think. Not only is my Controller a hopeless mechanic, but it is not too good at navigating either. Fancy positioning me right over a burning house." BG was far too annoyed with the Controller to even care if he gave away a few secrets but he was relieved to discover his peaceful Dove manner had vanished. But he was puzzled over the way in which Hooke's hair seemed to move whenever the man turned his head suddenly. Then his imaging software went haywire again.



Hooke, like many scientists before him, seemed to accept BG's thoughts quite happily and once the Great Fire of London had been put out, began conducting regular two-way thought sessions. But despite his annoyance, BG's programming would not let him explain who he or the Controller were, or where they had come from.

Hooke did his best to prise information from the singed Woodpecker without luck, but BG learned a great deal.

Hooke was trying to make a new type of telescope. He had also made some sketches of a new instrument for measuring the height of the Sun at sea with the aid of a mirror but these papers had been burned in the fire. He was so scatterbrained that he never bothered to finish making anything.

To his surprise BG was thought from Hooke that the French had also formed a scientific debating society and were hoping to make reliable clocks in order to help navigation at sea. So much for the Controller sending him to England and a City that had just burned to the ground. His urge to travel helped him to decide that he might be more useful in Paris.

BG became a Parisian Woodpecker and found that city far more to his liking. He spent a comfortable time getting to know the thoughts of scientists at the Royal Scientific Academy whilst planning his campaign. In his spare time he tapped on any number of trees in the parks and even succeeded in drilling several small holes, but never discovered why a bird should have been designed to do this. He never succeeded in climbing a tree without the aid of at least one thruster either.

A Woodpecker's feet might be excellent for tree climbing, but only if the individual had two of them.

A Dutch clock expert Christiaan Huygens was trying to convert one of his new pendulum clocks for use at sea and BG decided the time was right for meddling. Aware of his failure to communicate face to face with Galileo, this time he adopted a more forceful approach.

BG met Huygens by hopping into the French National Library where the clockmaker was working and boldly springing up onto a bookshelf. Huygens looked up from his book and glared at BG, who read his thoughts instantly.

"If you throw that book, I will ask the king to deduct the cost of the damage from your salary."

BG's thoughts came across as a clear threat and Huygens instantly removed both hands from the book and hastily held them high in the air.

In doing so the large mound of hair on his head was dislodged and slipped sideways leaving a bald patch exposed and depositing a fine mist of powder on the open book.

"What am I doing?" he thought, staring up at his hands and hastily pushing his wig back in place. But before he could think of an answer, the greatly puzzled singed Woodpecker provided it.

"You are being very sensible. Let me introduce myself. I'm the Great Ptolemy Bird God in the disguise of an aggressive Great Spotted Woodpecker Bird God. Slightly the worse for wear after helping your friend Hooke put out a fire over in London, a man who's hair incidentally is also prone to slipping, but I'm still quite capable of defending myself."

The clock maker was not completely convinced, although there had indeed been a disastrous fire in London recently and Hooke did indeed wear a wig. But BG did not offer any further proof.

"Suit yourself. Go on playing about with your pendulums, but one thing is certain, you will never be able to make a sea-going pendulum clock that will keep good time until you set it in gimbals."

Why had he suddenly thought this? BG had no idea, but it certainly got the clockmaker's attention and from then on BG had no trouble in conducting two-way thought discussions with the Dutchman.

Part two of BG's French plan involved Cassini, the director of the Paris Observatory. Contacting the Italian proved easy. He had heard rumours of a one-legged Dove from friends in Italy and BG explained that the black bits of his plumage were due to smoke damage, the red bits were paint and his claw arrangement had been altered to better suit the balance of the one leg. Otherwise he was the same Dove that had been with the famous Galileo when he died.

Unlike Hooke, Cassini was not a naturalist and accepted this peculiar explanation readily. In any case, all Italians appreciated flamboyant colours and BG was certainly quite a spectacle.

"Why are you trying to log the Moon's movements? Surely the moon's of Jupiter would be of more use?" BG hoped Cassini was no sailor either.

“Only because the king instructed me to. Personally I agree with you. In any case I already have many years worth of data on Jupiter’s moons.”

“I would suggest you forget about the Moon. With Huygens’s pendulum clock that is almost perfect, and your Jupiter data, you could solve the navigation at sea problem. Mind you, you would have to publish prediction tables for many years in advance, so that anyone could look up the details when far from home. The mathematics of that might take a while.”

Of course the French never would discover how to determine longitude at sea using Jupiter’s moons because accurate measurements of these tiny moons could only be achieved from a rock-steady platform. And Huygens failed to make a reliable sea-going pendulum clock because, however beautifully set in gimbals so as to remain perfectly upright in the wildest of storms, pendulum clocks relied on gravity which changed with latitude.

And of course whoever was controlling the Woodpecker must have known all this.

14
1675

In a brief transmission burst BG relayed a résumé of his French success story, only to be rather loudly thought to return to a new London location. So reluctantly back to London went the one legged Great Spotted Woodpecker. He had rather hoped to have been ordered to stay in Paris to watch his mission succeeding. This did not happen so frequently that he could afford to miss the occasion.

Had he known he was destined to spend the next 100 years or so battling with the English, their peculiar inventions and their willingness to blow their enemies to bits, he would have tried harder to have remained in Paris.

The new London location turned out to be a large park near the river Thames and BG wasted no time in hammering on several tree trunks by way of light exercise before settling into a suitable roosting tree. An odd place to be dispatched to in such a hurry. Perhaps he had been given the wrong co-ordinates?

On the very top of a small hill, slap bang in the middle of the park, building work was in progress and BG decided to take a closer look.

Two men were huddled over architectural plans laid out on a table by a pile of cut stone building blocks and clearly an argument was in progress. BG landed on a branch of a nearby tree and tuned in to the conversation.

“John, the wall will be strong enough to support your instrument and the foundations are already laid.” The tall thin man sporting the now familiar pile of movable hair, jabbed his finger at the plan and then pointed across to a trench.

The smaller man with a worried look, a bent back and a straggle of hair that was obviously his own, was not at all sure and said so in a surprisingly deep voice.

“My good sir, I am paying for this instrument out of my own pocket and I do not consider your wall will support its weight. No sir, you must increase the strength of the foundations. The king won’t notice the extra cost, any more than anyone has noticed the extra costs you are quietly adding to the rebuilding of St Paul’s Cathedral.”

BG realised that St Paul's was already being rebuilt after the great fire that had destroyed the last one, and that the tall man must be the architect rebuilding it. It was also clear that the smaller man knew how to get his own way. But what was this construction and why was it being built in such haste?

From collected thoughts BG soon concluded that another observatory was being built, which the English king was paying for, and the small man was to be the director. But the instrument at the centre of the dispute was not being paid for by the king; why not and what was it? He would have to tune in carefully.

Smoothing his singed feathers as best he could, BG shot off the branch and swooped down towards the two men landing with just a touch of thruster right on the plans. This new forceful style of entrance would once again surely provoke some sort of equally spectacular response.

The architect lashed out at BG with the back of his hand, angry that his precious plans might be spoiled by an ungainly bird. Not the response BG had been expecting! A tiny blue flash met the man's hand before it had travelled less than half way and knocked it sideways. BG remained motionless, but Sir Christopher Wren, for that was the architect's name, could not write for a week.

"I'm not an ungainly bird, I'm the great Ptolemy Bird God," thought BG hastily, hoping to calm the situation before he made another mistake and killed someone again.

Wren stopped looking at his hand and transferred his attention to BG. Had the crazy bird said something?

"Nothing; I thought it. Try that again and I'll send a bigger pulse of electr...." BG stopped just in time. What a fool; another report that would require doctoring.

But Wren understood he was being threatened and backed away from the table. The smaller man began laughing; a deep booming laugh that echoed across the park. He laughed and laughed until tears ran down his cheeks and his faced started to turn a deep shade of red. Eventually he had to stop because he had developed a coughing fit. By the time he had recovered, Wren was already a small figure in the distance, hurrying down the hill to his waiting coach.

"Good riddance. He's a pest. I'm thinking rather than speaking because if you really are the latest one-legged version of Ptolemy's Bird God you will understand, and if you're not, thank you anyway." John Flamsteed, soon to become the First Astronomer Royal, did not realise the unscientific-ness of this thought and in any case BG was already thinking him a question. *"What is the nature of this instrument you are having made?"*

"It's called a quadrant, it's being made of metal, and will be fixed to the wall we were just arguing about. It must remain perfectly upright and lined up exactly on a north-south axis or it cannot be used to measure the absolute height of the Moon each night accurately. That fool Wren knows how important this is because he is an astronomer too, or so he claims. Yet because he is in a hurry to finish this building for the king, he is trying to cut corners. I'm not standing for it!"

"I saw a quadrant when I was in Alexandria with Ptolemy. It was a gigantic stone thing with a sighting tube that moved up and down. Why do you have to fix one to a wall?" thought BG.

"Because this one will be much more accurate than those old stone ones. It has to be able to measure the angles of the Moon properly, every night it is visible, for at least 18 years. It must not be allowed to move by even a fraction during that time or else the entire work will be wasted."

BG knew, as had his old acquaintance Hipparchus, that the Moon, because of its wandering orbit only returned to the same spot in the Earth's night sky once every 18 years and 11 days and he was now beginning to worry. *"Why the Moon in particular?"* he thought innocently.

"Because the mighty King Charles II says so. He is paying to have this observatory built here in Greenwich Park because he and his cronies are losing money. English ships carrying slaves from West Africa to our American colonies are sinking too often and so are the ships bringing cotton and tobacco back to Bristol from the colonies."

"Let me get this straight. The king is paying for an observatory to be built just for you to measure the movements of the Moon to save his ships from sinking?"

But BG already knew the answer that Flamsteed was going to think him.

"If we can predict the Moon's movements accurately in advance, sailors will be able to work out how far west or east they have sailed, which at present is impossible."

"But surely sailors cannot be expected to check the Moon's position so precisely from the deck of a ship?" BG certainly hoped not, but these English scientists were not fools and they must already be working on that problem too. He needed to know more about this.

"That's not my problem, but I do know the Royal Society's Curator of Experiments, Robert Hooke, who incidentally is supervising the construction of my quadrant, is already claiming he has invented a new instrument that can do this. He is using mirrors I believe."

"Oh dear dear," thought the Woodpecker quietly, *"and just when the mission was getting back on track. What now?"* He decided to deal with these problems one by one, starting with Flamsteed.

"I'm surprised you are encouraging the king to trade in slaves. I was with Columbus when he captured some poor people and dragged them back to Spain. Not a nice way to treat your fellows."

Flamsteed nodded. *"I agree, but I might be able to save some from drowning."*

BG thought he knew why the replicator had produced a drilling robot.

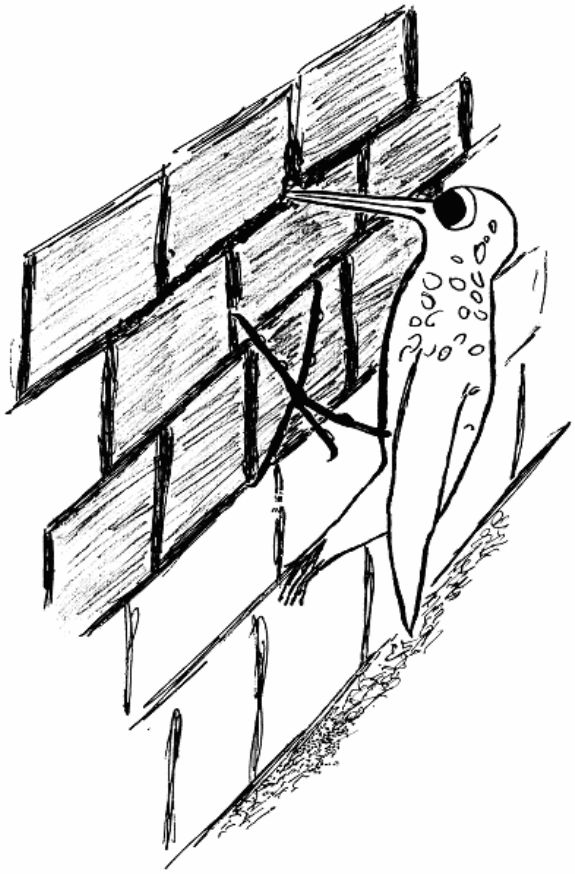
Over the following weeks, BG watched the builders during the daytime. First they reinforced the foundations as Flamsteed had demanded, and then they laid the cut stone slabs on top.

At night BG quietly hammered away at the mortar filling of some of the stone slabs of one particular section of the wall. It was not an easy task to camouflage his efforts having only the one foot and he used up more thruster energy than was wise. But this was an emergency.

BG proudly transmitted his latest report, but the Controller was not at all complimentary.

"All that tapping must have dislodged some of your circuitry. Did you really imagine destabilizing a few slabs would have any effect? The quadrant is a massive piece of equipment and the only way to upset the calculations would be for the entire wall to very slowly sink at one end over a number of years without anyone noticing."

The Controller, to make his point transformed it into an order.



"Put all the mortar back before someone becomes suspicious. Then carefully undermine one end of the foundations and cover your track." With that the Controller cut the thought transmission.

The one-legged Woodpecker up in the tree had in recent weeks become inexplicably dirty. But a week before King Charles II came to open the Observatory it disappeared. Flamsteed did wonder where it had flown off to, but was so busy supervising the fixing of his precious new quadrant to the wall, that he soon forgot all about it.

It would take the Astronomer Royal more than 15 years to discover that the northern end of the wall that his quadrant was mounted on was very slowly sinking and that all his lunar measurements were suspect.

Meanwhile BG had returned to the City of London in search of Robert Hooke. Had the drawings of his measuring instrument making use of a mirror really been burned in the fire and what, apart from making the huge metal quadrant for the new observatory at Greenwich, was the scatterbrained inventor up to now? BG had to find out without showing too much interest.

Hooke was easy to locate. He was still in the same house where BG had singed his feather coating. But the building was hardly recognisable. On his previous visit the place was on the very edge of the Great Fire and had only just avoided being burned to the ground. Now it was a hive of industry and BG found Hooke sitting behind an imposing desk, wig askew, waving his arms about and shouting orders at the top of his voice.

The Woodpecker perched awkwardly on a chair-back in a dim corner of the room and tuned in to the babble of thoughts. No one paid him any attention; they were all far too busy rushing about. They probably though he was one of Hooke's latest experiments or a stuffed specimen that the curator had forgotten to put away.

BG gathered that the house had been taken over by the City of London's planning department and Hooke was now helping to rebuild the fire-ravaged city.

Late in the day a lull in the traffic of people let BG break straight into Hooke's thoughts and the busy executive peered tiredly round the room.

"Ah, there you are. You look even scruffier than last time." Hooke did not seem at all surprised to see BG again and sat waiting for a response.

"Actually I visited Paris but everyone there seems busy so I wandered around and eventually came back to London. You seem to be making a fine job of rebuilding. How is the scientific research getting on?" BG was not too sure how to broach the subject of the inventor's measuring device and yet still appear disinterested.

"No time at the moment; the telescope is not going to be easy to make with every metal worker being so busy; and asking very high prices, I may add! I have an idea for making a very small telescope that still has enormous magnification. Instead of lenses at each end of a long tube, this one will only have a curved mirror at the back. This will reflect the image back up to another flat mirror and out of the side through an eye piece."

BG understood exactly what Hooke was trying to describe; a reflector telescope of a rather primitive design. If the man could ever get round to actually making one it would revolutionise astronomy on this planet. Pity.

But Hooke had not finished. *"There is a fool of a mathematician from Cambridge University who calls himself Nerton or Newston or something like that, who claims he has already made a reflector telescope, but I've no time for the man."*

Hooke switched most of his thoughts in the direction of a much needed drink but continued to think intermittently about his hated rival, Isaac Newton.

BG tuned in to these as best he could. Hooke was being deliberately vague over the story of the reflector telescope invention and his thoughts gave the game away. As far as BG could ascertain from Hooke's confused thoughts, Newton had actually made a miniature reflector telescope with his own hands and demonstrated it to King Charles II. Right under the nose of Hooke, who was still bumbling about trying to find someone to make his version. BG made a mental note to put Newton next in line on his visiting list.

"But what of your measuring device?" BG decided he had to be direct before Hooke's mind wandered elsewhere.

"Oh, I did read a paper on my ideas for a new measuring device to the Society, but no one has time to write up the minutes of meetings at present. Might when the rush is over of course, but I doubt it."

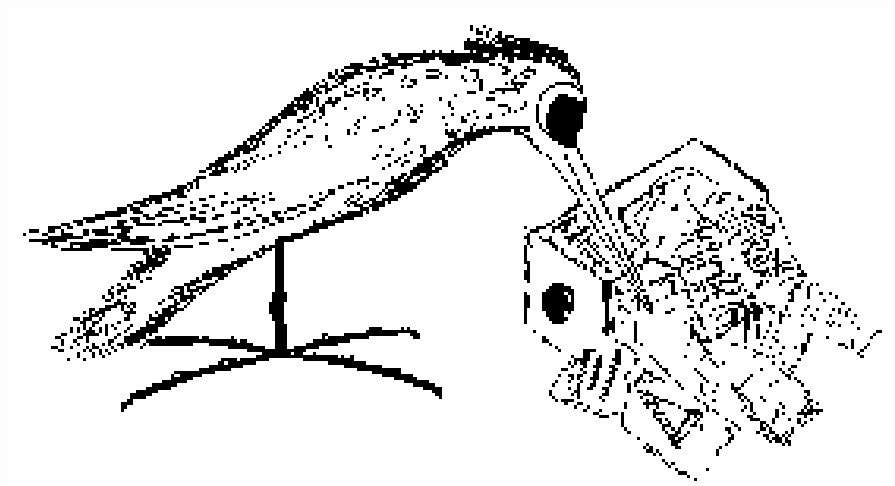
"Do you have a drawing?" thought BG.

"Somewhere amongst the paperwork, but it's not important."
Hooke tapped his head and BG hoped the inventor's brain would transmit a vision of the instrument. No such luck and all BG received was a vague outline of the planned new St Paul's Cathedral.

Hooke started rummaging in the lower draws of his desk but gave up because he suddenly remembered he was thirsty.

"Stay the night dear bird. Make yourself comfortable and we will resume our thoughts in the morning. I'm just off to a coffee- house."

Thinking nothing further, Hooke slammed the drawers shut, rose hurriedly and stomped out of the room.



BG hopped round to the desk and pulled a drawer open. A Woodpecker's short leg was nearly as difficult to get about on as his Albatross version. Pulling drawers open was not too easy either because his beak could not get a good grip on the large round wooden knobs.

He seriously considered hammering in through from the back, but that would have alerted Hooke. Even when a drawer was open he had to pull each sheet of paper out, examine them all and replace them. In the fourth drawer he found what he was looking for. Two sheets of paper with several sketches of what appeared to be an angle measuring device consisting of measurement scale and a small thin telescope with a mirror angled across one end.

BG accessed his data bank, but obviously the programmer on his home planet had never come across a similar design. Nothing. The robber Woodpecker folded the papers into a small square by jumping on them with his large foot, hopped across to the fireplace and hammered them into a crack up in the chimney.

"With a bit of luck, they will turn into ashes next time someone lights the fire," he thought, *"and with a second bit of luck Hooke will forget he ever invented it, whatever it is."*

Somehow Hooke, obviously not thinking properly, had failed to convey to BG the fact that he had actually manufactured a working model (a device for taking angles by reflection as he called it) which was at that very moment lying in the Royal Society's storeroom.

Many years later, shortly after Robert Hooke's death someone found the drawings, unburned and still in the crack in the chimney where BG had jammed them. But by then the working model had disappeared without trace. Not one of BG's best performances.

15
1675 – 1682

Locating Isaac Newton was easy. BG simply followed the wheel ruts of the Cambridge mail coach. He preferred this slow method of travel whenever his mission was not urgent as it gave him a better overall impression of this strange planet. Flying well above the thousands of humans, with all their petty quarrels and lying, murderous habits kept at a distance was a pleasant change and BG got the chance to examine other life forms. The trees, the birds and insects. No real thoughts coming from any of them, but no murder in the name of greed either.

But BG's peaceful trip was spoiled by the manner of his arrival and Newton's response. He really should have planned his intended two-way thought transmissions with a frustrated alchemist with a little more care.

Trying to land in a small tree near Newton's workshop was the first mistake. Unlike the large trees in the park at Greenwich, this one had no convenient perch and BG had to cling on to the main trunk just as a real woodpecker would have done. This left him in an exposed position facing the trunk. The deliberately noisy clatter of his landing brought Newton from his workshop as intended but when BG attempted to communicate, Newton merely assumed he was thinking to himself as usual, glanced carefully at a woodpecker clinging to the trunk of a small tree and went back inside, shutting the door firmly behind him.

BG decided Galileo and Newton had a lot in common and set about implanting thoughts from a distance. This was not very successful either.

"I don't care if you are the Great Ptolemy Bird God of oracle fame currently in the cloak of a Woodpecker clinging to a tree outside my workshop. In fact if you really are I do care now I come to think about it; apart from not believing in oracles. I happen to know Ptolemy was a liar and he deliberately altered some of his data to fit what he thought were the facts. In my book that is straightforward scientific fraud. His fake measurements are causing me all sorts of problems because I don't know which are fake and which are genuine."

BG could have helped him. After all, it was he in his Ostrich outfit who had been responsible for some of the faking, but he wisely decided to remain thought absent on that issue. He tried another tack.

"I understand from Robert Hooke that you claim to have invented the reflector telescope. Could I see it please." Another mistake and BG wished he was back in the air with the birds and the bees.

"No you cannot! And you understand wrong. The reflector telescope was designed by John Gregory years ago. I merely manufactured one. As for that drunken Hooke fellow, don't believe anything he tells you."

Short of compromising the mission by thinking Newton which of Ptolemy's figures were wrong, his data bank could produce nothing which might break the ice. While he clung to the tree trunk, a somewhat dejected failed robot Great Spotted Woodpecker whose double vision was returning, Newton himself resolved the problem.

"For years I have been trying to convert base metal into gold" he thought. *"No success because I have not yet found the right proportions of lead and tin I suspect. As you claim to be a god of some kind, wave your magic wand over my mixing bowl. Turn the contents into gold or clear off out of my brain!"*

BG cleared off, leaving Newton wondering if prolonged exposure to the fumes from his experiments had caused him to hallucinate. Woodpecker oracles indeed!

"Perhaps I have the wrong image. Any suggestions?" BG was once more alongside the spacecraft having been commanded to report in person yet again.

Both the Controller and Little Stalk were peering out at him. BG was idly wrapping his enormously long tongue round a solar panel and was in danger of shorting out the spacecraft's entire electrical system.

"Unwrap it and put it away." The Controller really had no sense of fun and when Little Stalk tried to imitate BG by attempting to wrap its own tongue round the Controller's leg, it found itself kicked behind the long-range star-plotting unit again.

The Controller, having examined BG's report, was at a loss for productive thoughts.
"I think we should have a little nap on the Moon until the next Great Comet wake-up call. Then we can leave it to the replicator programming; it always comes up with good solutions. Your Woodpecker version was yet another example."

BG thought *"Good solutions? My Woodpecker version has just left me clinging to a tree trunk facing the wrong way,"* and then thought of several other examples of himself which were far from good. *"A one-legged Albatross that could only paddle in circles and had to use thruster power to get airborne! A snake-eating tropical Secretary Bird sporting a fly curtain in the mountains of South America, a Penguin hopping around the streets of Prague, ..."*

The Controller cut him short but gave the impression it was doing its best to be sympathetic. *"We are going to the Moon, and that is final. As a special treat you can hang on to the base of the grab arm and we will go slowly. Use your foot, not your tongue!"*

BG did not believe a single thought of this but did as he was told, expecting at any minute to be sucked into the external replicator unit as usual. He was wrong once again.

The spacecraft made a gentle controlled landing in a bolder-free area of the Moon, but the Woodpecker version of BG was not quite so fortunate. The Controller had retracted all the external bits and pieces at the last minute and left BG hanging in space.

Owing to the lack of atmosphere and low gravity, BG had not had time to react to the sudden and unexpected loss of his foothold and had made an undignified crash-landing in a cloud of moon-dust. When he tried to dust himself off he discovered that some of his feather coating was missing.
"You might have warned me, and what happened to my feathers?"

Two sets of miniature faces were studying him from the safety of the spacecraft. He could swear they were both smiling.
"You must have known I had to retract the apparatus before landing. I could have damaged the replicator otherwise."

BG wished it had been damaged, then took the thought back.
"What about the feather coating?"

"Oh that probably blew off somewhere as we made our approach. You do look decidedly odd. Now you have my permission to do some sightseeing like you've always wanted." So thinking, the Controller shut the viewing ports, set the Great Comet alarm, trashed Little Stalk with considerable satisfaction and switched itself into standby mode. BG was tempted to bury the spacecraft in moon-dust but thought better of it and went exploring instead.

Some years later, at the first distant sighting of the Great Comet, BG made his way quickly back to the spacecraft. Having explored every inch of the Moon, a service was now urgently required. The very fine moon-dust had worked its way into several essential items of equipment because of his lack of coating.

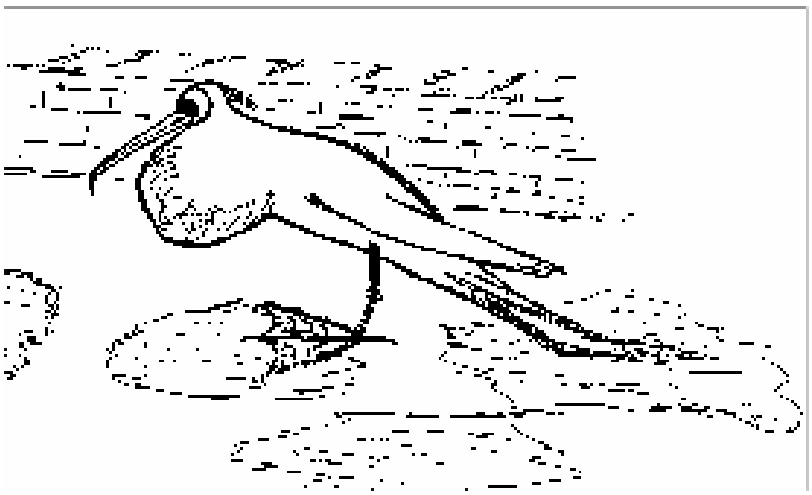
The spacecraft had already come alive and the replicator unit was extended. For once BG wasted no time in letting the grab suck him in, not even bothering to try to see what the latest miniature test version had turned out like.

As soon as he re-emerged, the entire unit retracted and the spacecraft shut down again, which came as quite a surprise. BG tapped on the hull with his beak, but nothing happened. Then he checked his computers for new instructions. Yes, he had been programmed with new Earth co-ordinates and had been ordered to get there as soon as possible. He thought that the Controller might have been polite enough to have communicated these instructions personally instead of rapidly going back into standby mode.

It took him nearly two days and more thruster power than he cared to think about to get from the Moon to his mission destination. He was back in London. No real surprise on that score, but his new outfit was going to turn a few heads. No wonder the Controller had gone back into hibernation so speedily.

BG had expected to find Newton at his programmed destination but this now seemed unlikely. He had landed awkwardly on top of a low wall at the side of a muddy street, outside an ale-house in a rundown part of London alongside the river Thames.

He had noticed dozens of ships tied up to the wharves as he arrived and there was noise and bustle all around him. Maybe someone would tell him what sort of bird he was supposed to be as he was so close to ships again? A webbed foot was used for swimming on water and he was in possession of one large webbed foot for the third time.



The most pressing question awaiting an answer was the red patch on his chest which inflated automatically whenever someone stared at him; which was frequently. The long trailing tail streamers that were at present drooping into the mud were merely a minor inconvenience compared to this pumping up of his chest from throat almost down to the top of his leg. Being bright red when the rest of him was pitch black simply attracted even more stares and within minutes a large crowd had gathered, completely blocking the road.

BG had just extracted himself from this mob of humanity by performed a swift spring up on to the river wall when the ale-house doors were flung open and a body hurtled out which landed in the muddy road with a squelch, scattering the crowd. It was Hooke, minus wig and the man had obviously come off second-best in a dispute of some kind. So that was why BG had been sent here.

Out of the doors rushed a younger man with bright ginger hair, who picked Hooke up with considerable difficulty. To cheers from the crowd the pair staggered back towards the ale-house, but changed their minds when the innkeeper barred the way. Turning again, Hooke's companion caught sight of BG out of the corner of his eye and stopped dead in his tracks, letting go of Hooke who promptly fell down again.

The man pushed his way roughly through the crowd and stopped in front of BG, staring at him like all the others. BG's red pouch inflated again. "Well I be blowed, you're a bit off course my lad."

He scratched his head and turned to the crowd. "This my friends, is a Frigate Bird, a male I might add, owing to its bright red display pouch. Though what exactly it is doing perched on a wall I do not know." The crowd pressed closer and one young street urchin tried to grab BG's foot.

Instead of the usual automatic zap defence, BG had just enough time to react more sensibly. He lunged forward and nipped the lad's finger with his beak, at the same time thinking *"Sorry about that, but I really do not wish to be pulled about."* BG's latest image was as aggressive as the Woodpecker version.

The grubby lad snatched his hand away and almost everyone, including BG, were shocked to see that one side of the lad's finger had been cleanly sliced almost to the bone.

"Serves you right young'un. You're lucky it didn't rip your finger right off, like I've seen them do many a time with squid and fish, down St Helena way." Hooke's drinking companion was presumably a seaman.

But the crowd was becoming hostile, so BG decided on a quick vertical retreat to the ale-house roof which left the ginger-haired young man peering skywards in amazement. Not your normal Frigate Bird, that was for certain. Then he remembered his friend and rushed across to help him up again. But Hooke was not so drunk that he had missed the vertical retreat. He suddenly seemed to be sobering up rapidly.

"Get me up, Ed. It's that Bird God thing I told you about. Start thinking to it before it zooms off to Paris again, I want to think to it."

And that is how Edmond Halley, astronomer and adventurer, first met BG and how Hooke mislaid his wig for the tenth time in as many weeks.

"I'll come down when the crowd has gone. I'm not permitted to hurt people." Both Halley and Hooke registered BG's thoughts clearly and Halley, quick on the uptake thought back.

"We have to go to Doctor Hooke's house to use his telescope. Come with us, you will be safe with me."

BG, who was of course quite safe anyway, nevertheless took Halley at his word and made a gallant attempt to glide bird-like, down to Halley's shoulder.

He still had memories of that chattering Parrot perched on a sailor's shoulder and had always secretly fancied doing the same. Of course he had tried it with Columbus, but a perching singing Canary did not create much of a lasting impression. But a robust seabird perching on the shoulder of a sailor would be something to put in his report that would put Little Stalk firmly in its rightful place in the robot hierarchy; at the very bottom.

But BG would have to erase that part of his report because he forgot he was no longer the special lightweight Albatross robot. Halley's shoulder was not prepared for the clumsy landing of much more than five kilograms of robot bird, especially when normal Frigate Birds weigh less than one.

In trying to get a grip, BG's claws ripped the entire sleeve from Halley's jacket before he was again forced to use more of his limited supply of thruster power in order to prevent a second muddy landing in the street.

"Lead the way, I'll follow at a safe distance. Sorry about that"
BG thought, again trying to cope with his inflated chest.

In the attic of Gresham College where Hooke still had rooms, there was a large telescope.

That night, while Halley lined this up with the Great Comet, Hooke tried to use a quadrant to measure the distance between the head of the comet and the nearest star. Eventually Halley had to take over the measuring task while Hooke went in search of a fresh supply of alcohol.

Halley took measurements for hours until the comet disappeared behind a building, muttering the angles to himself as he carefully wrote each one down.

Halley thought to BG in a simple, easily understood way. Presumably he thought a Frigate Bird, however heavy or strange, required simple schoolboy explanations.
"I've watched this comet for two nights now. I believe it travels round the Sun like we do. But I think it has a big elongated orbit but we only see it when it comes close. If I can track its progress, I might be able to work out the size and shape of its orbit. If so, I would be able to predict when we will see it again."

"It's unlikely to be in your lifetime. It won't be back until 1758." BG realised the danger half way through the thought and tried to stop the date escaping. But although it was transmitted at minimum power, Halley was paying very close attention and received it all.

Halley had been briefed carefully by Hooke on the way back from the ale-house and Hooke was a very clever man, even when he had been drinking. Once again BG had put his only big foot right into trouble and all because his computer mind had been spending more time worrying about the embarrassment of ripping Halley's sleeve off, than on keeping dangerous information private. BG made a hasty exit out into the night before he could give anything else away.

BG knew this mistake was too serious to erase from his report and the sooner he contacted the Controller the better his chances of remaining un-trashed would be. Then he remembered that the spacecraft was in standby mode until the year he had just given away to Halley. He doubted he had enough fuel to pay a visit to the Moon and even if he could reach the spacecraft his chances of waking it up were doubtful.

He would have to trigger the meteor alarm and he had no idea how it worked. A swift kick might do the trick, but then again it might not. The only other alternative was to trigger a major happening here on Earth that would set off the alarm that warned of unusual events at sites of special interest. Not a brilliant idea either as another really good fire like the one that set the alarm going last time, could also cause loss of life like the last one presumably had.

So the heavyweight Frigate Bird sensibly decided to lie low, to keep his thoughts strictly to himself and to mind his own business until the return of the Great Comet in 1758 and the awaking of the Controller. But of course BG was never going to manage this.

Halley and Hooke both wondered where the Frigate Bird thing had gone and searched the news sheets for reports of a strange bird, but without success.

“I do wish we could locate it” said Halley, “That date it gave me tallies roughly with my predictions, but I didn’t get enough measurements to be at all certain. But if that bird, or whatever it really is, was right, it confirms Kepler’s data on elliptical orbits and that in turn will help us determine Moon positions relative to stars for navigation.”

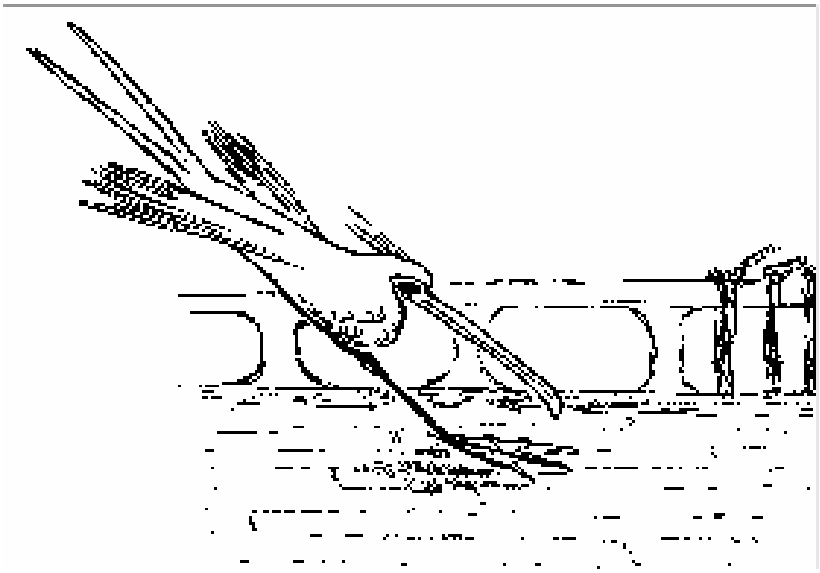
“And it will help Newton with his gravity nonsense. I’ll have no part of that.” Hooke was adamant, even though he was well aware that the “gravity nonsense” was nothing of the kind. He just wished he had thought of it first. After all, it explained at long last why people round the other side of the planet did not fall off; why the atmosphere did not blow away and why there was no great and continuous wind from the east.

Halley, not wishing to be drawn into the Hooke versus Newton dispute, being a friend of both, changed the subject. “But if we could somehow entice the artificial bird back, we could pick its brains again. It must be able to predict the future. Think what we could do with its help.”

Hooke, who was thinking of going to an ale-house, could only suggest placing an advertisement in a broad-sheet or leaving a “come home” note in his window. Halley could think of nothing either, so they went to an ale-house.

16
1698 - 1705

Sixteen years passed without anyone reporting the sighting of a one-legged Frigate Bird. Then, there was Halley, sailing off down the Thames at the start of a voyage to the South Atlantic, captain of the Royal Naval research vessel *Paramore,* and who should alight on the deck right beside him, but BG. The landing made several long scratches in the otherwise immaculate decking but Halley pretended not to notice.



"I happened to pick up news of your trip and as I'm a seabird, I decided to join you."

Captain Halley accepted these thoughts without appearing to be any too pleased. *"Where have you been since you ripped my jacket?"* He eyed the scratched decking, and BG's red front puffed out despite his best efforts at control.

"Here and there, mostly resting." BG was not going to tell him he had been lodged rather uncomfortably in a tiny space in the attic of the house where the Royal Society held their meetings for most of the last 16 years. There he had followed some of the thoughts of those attending, which was the real reason he had decided to join the expedition. Halley was going to sea to test Isaac Newton's new invention, even if most people thought he was going for an entirely different reason.

"I felt in need of some fresh air," which was a perfectly true thought. *"Are we off to anywhere interesting?"* which was not quite so true a thought because BG already knew the details of Halley's sailing orders from the Admiralty.

"To the South Atlantic to take measurements of the Earth's magnetic field in different places so that we can make an accurate chart for mariners to allow for the variations on their compasses. We don't really know why the compass does not always point to the north."

BG merely nodded. He was not going to fall for that one. Halley knew the magnetic north pole of the planet was to the north- west of Greenland and the true north pole was hundreds of miles away.

Near noon on the first sunny day at sea Halley brought a small wooden box from his cabin and opened it carefully on the top of a hatch cover. BG had seen the box in the captain's cabin where he had established his base in a corner by the bunk, but had deliberately shown no curiosity. Plenty of thought transferring between the captain and BG on such diverse subjects as the size of Columbus's cabin, exactly where Julius Caesar first landed in England, and even why Halley had been appointed to the rank of Commander in King William III's Royal Navy when he was merely a civilian scientist. But no thought mistakes on BG's part so far.

The box contained a small but curious brass instrument; a triangle with one curved edge, which was marked off into small segments. A long movable arm, two small mirrors and a tiny telescope were fitted on one side. BG trawled hastily through his data bank and concluded, correctly that this was a primitive angle- measuring device, although not nearly as primitive as the one Hooke had designed.

Halley fiddled with a small screw which allowed the long arm and one of the mirrors to change position. Then he held it up to the Sun and fiddled some more. Halley's brain gave BG the rest of the answer. This device was for measuring the angle between the Sun and the horizon just as the earlier Hooke design could have done. But the second mirror meant that the instrument could be used even when the ship was rolling violently and also allowed it to be checked for faults at sea and put right on the spot.

This, thought BG very quietly, was the greatest advance these humans had ever made in the field of navigation. He hopped over to Halley and examined the instrument carefully.
"Beautiful, and a great advance on the back-staff. Newton's work I assume?"

"Yes, but why such a great advance?" Halley was baiting him. So BG played the captain's little game and told him about the advantages of the second mirror. As if he didn't know! *"And you probably helped design it."*

"Yes I did, but that second mirror was all Newton's doing. He made this marine quadrant in his spare time at the Royal Mint where he is now in charge of coin production."

Over the following months BG carefully watched the captain take any number of noon Sun and night-time Moon measurements and even more carefully watched while he calculated his position with the aid of prediction tables. *"Where did those come from?"*

"The Sun prediction tables which permit me to determine latitude were printed ages ago and based on the work of Zacuto but the lunar information is part mine and part the Astronomer Royal's. Newton obtained them from him to help pin down this gravity business. For some reason Flamsteed was very reluctant to supply the figures; claimed he had recently discovered faults in his measuring equipment."
BG realised his undermining of the quadrant wall at the Greenwich Observatory when he had been a Woodpecker all those years ago had actually paid dividends (although the even earlier Zacuto incident now seemed to have been a failure) but this time he managed to think absolutely nothing.
Halley continued, *"Once we can accurately predict the Moon's exact position in the night sky we can determine our longitude at sea. The Moon can be used as a clock, but impossible to achieve without Newton's quadrant."*

An unusually useful string of thoughts from Halley which confirmed BG's concerns. This expedition had to be brought to an end and Halley and Newton somehow discredited. And the Controller was in standby mode and unavailable, parked on the surface of the Moon, the subject of all the trouble.

Once again BG noted he was on his own and once again he came up with a possible solution. Having already accessed the thoughts of all *Paramore's* crew at one time or another, BG knew that the ship's first officer Edward Harrison, a professional Royal Navy navigator, was jealous of Halley's expertise with the revolutionary new angle-measuring device.

Harrison had been boasting to the crew that their captain really knew nothing about navigation and that the ship was dangerously way off course. Following some very strong BG thoughts directed at him, Harrison persuaded the helmsman to change course one night when Halley was asleep.

BG then scratched the top of Halley's cabin trunk and the captain awoke with a start, immediately sensing something was amiss. Rushing up on deck, a quick glance at the steering compass was all that was required. The helmsman blamed Harrison and Harrison openly accused his captain of dangerous incompetence in front of the crew. Left with no option, Halley was forced to abandon the voyage and headed *Paramore* for home.

Shortly before sailing up the English Channel, Halley recorded the latitude of the Scilly Isles and noted in the ship's log that the islands were, according to Newton's instrument, some 15 miles farther south than indicated in the Royal Navy pilot manual.

Edward Harrison was court martialled and the case was tried on board *Swiftsure,* the 70-gun flagship of Admiral Cloudesley Shovell, Halley's commander-in-chief. Although Harrison was dismissed the service, Shovell did not examine the ship's logs in detail and expressed the opinion that Royal Naval vessels should not be commanded by astronomers.

BG felt pleased with himself, because perched high in the flagship's rigging and more or less out of sight, he had been able to follow the entire proceedings; no lives had been lost and no one had taken any notice of Halley's research or results.

Shovell's obvious dislike of Halley was particularly helpful. And the Frigate Bird God had accomplished all this without the help of the Controller. But once again BG had been a little careless.

Back in his secret London roost BG continued to eavesdrop on Royal Society scientific developments. He was very concerned when Isaac Newton gave a demonstration of his angle-measuring device and claimed that Halley had determined longitude at sea with its aid.

From thoughts that BG could access, no one appeared particularly interested but nevertheless this was another dangerous situation which called for intervention. Time to pay Newton another visit and this time BG was better prepared, or so he thought.

The Frigate Bird God made a poor landing on the thatched roof of the Royal Mint's main office inside the outer wall of the Tower of London. Unfortunately he had not made due allowance for the gusts of wind swirling round the courtyard. A brief thruster burst solved the problem but set the thatch on fire. BG hastily stamped out the flames with his oversized web foot, but the disturbance brought Newton running out, just like last time. But since the first meeting Newton had given the matter of odd visiting birds considerable thought. He was certain there were gems of knowledge within his own brain waiting to emerge; perhaps pretending to converse with a Woodpecker might unlock them.

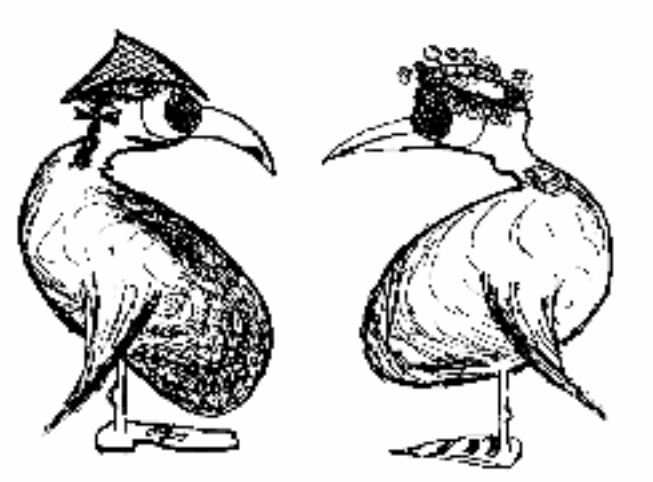
So, staring up at BG, and ignoring the fact that the bird on his roof was not a Woodpecker, Newton thought *"If you are the same oracle I met in Cambridge, I told you to clear off or produce some gold. Where is it?"*

"Having seen the poor quality of brass used in your new measuring device, I decided that rather than gold you would prefer some nice flat sheets of brass." Not that BG actually had any about his person but he was sure this would gain Newton's attention. He was mistaken.

"I know how to make brass sheets you one-legged idiot" thought Newton, *"In fact I am the only person in the entire world who does know how."*

BG's chest began to puff up, Newton began thinking quite clearly of calling the guard and having him shot and BG decided a mild zap would be appropriate. At this point who should waddle round the corner but Admiral Shovell in all his finery. BG's data bank produced a linked image of Heraclides and the Admiral and his own chest subsided.

Newton hastily ushered the bemused admiral inside and BG settled down to eavesdrop.



“Was that a Frigate Bird on your roof sir?” Before Newton could reply, the admiral, who thought he knew everything, answered his own question. “Of course it was, seen thousands of the beggars at sea. Nasty brutes always stealing other birds’ food. Good blast from a six-pounder would soon sort it out.”

Newton wondered why the admiral had turned up at the Mint but BG had already accessed Shovell’s thoughts and immediately dealt with the danger by implanting a few of his own. For once the Frigate Bird God had acted decisively.

“Your friend Halley showed me the measuring instrument that you have invented. He assures me it is far superior to the Navy issue back-staffs. How much will the Royal Mint charge to make 100?”

Newton was not sure how serious the admiral was, considering the way the Navy looked after their back-staffs and compasses, neglected their charts and pilot books and generally gave the impression that navigation was an art only they understood. In any case, making the one he had loaned to Halley had taken months and the Mint was far too busy to accept a bulk order. He quoted an enormous sum adding “and tuition will be extra.”

“Oh good, I hoped they would be very expensive. You do know we can build 10 warships for less? Yes of course you do. The Navy doesn’t want to purchase any of these newfangled devices, but we do want to make sure the French never lay hands on one. So I am authorised by his majesty to make you an offer.

Destroy your instrument and drawings and the king will appoint you Master of the Mint when Mister Neale retires at the end of the year. What say you?"

The admiral wondered why he had made these comments when he had only been instructed by the Admiralty to negotiate for the purchase of 5 prototype instruments from the inventor. And how was he going to persuade Neale to retire so as to fulfill this ridiculous promise? But before he could consider changing his mind, Newton had accepted his offer. The higher salary plus the huge commission paid to the Master would make him one of the richest men in the kingdom.

"Say no more sir, and as everyone connected with the Mint, including Commander Halley, has already signed the official secrets act, our enemies will never discover any of the details." Newton sensibly failed to mention that he had recently demonstrated the instrument in question at a Royal Society meeting.

Thus it came about that the only instrument ever invented by the great Isaac Newton never went into production. Again Newton was convinced he had been hallucinating. First a Woodpecker and now a Frigate Bird and still no new brilliant ideas recovered from his subconscious. And what was all that nonsense about sheets of brass? Then Newton realised what he had surrendered to the fat admiral in return for fame and fortune.

"Our enemies will never discover any of the details" he had promised the king's representative. One of the key elements in the marine quadrant design had been his secret method of making large flat sheets of brass free of imperfections. Not only had his only invention been placed on the nation's secret list but so had his revolutionary new metal-working process!

Within months Thomas Neale was dead and Isaac Newton was immediately appointed Master of the Royal Mint, the first Warden ever to achieve such a position.

17
1707

Two years after Newton had been knighted for services to the Royal Mint by the new monarch Queen Anne, BG picked up some thoughts on Royal Navy ship movements under Shovell's command at the great naval base at Gibraltar and decided to go to sea again just to keep a very large eye on Shovell. Not a trustworthy type.

The Frigate Bird God checked his fuel supply and realised there was no immediate cause for concern. A trip to Gibraltar was nothing compared to a trip to the Moon, which he could just have managed, so he arrived at the entrance to the Mediterranean in next to no time, not even noticing the storms in the Bay of Biscay on the way.

On arrival BG discovered that in addition to several English battleships there were dozens of merchant ships. Two of the battleships were massive and all had their gun ports open for ventilation. BG could see that the largest carried three decks of cannon, nearly 100 pieces of primitive but lethal machinery in just this one ship. He was in the right place, but would the Royal Navy permit a Frigate Bird to perch on deck, let alone roost in a captain's cabin? He soon found out.

As he zoomed round the ships a marine fired a musket at him. The pellets and rusty nails whistled across the water and although BG took avoiding action one of the nails clattered against his metallic coating. Once out of range he alighted on the surface of the harbour with the usual awkwardness. A close inspection revealed no damage so he paddled round in circles waiting for the Sun to set.

Well after dark BG performed a thruster-assisted launch and landed as quietly as possible on the after deck of the smallest of the English warships. He had selected this one for two reasons. It was a vessel with a run-down look about it and no worthwhile thoughts had come from it all day. The name painted across its stern in faded gold lettering could have told BG what sort of ship it was had he been a naval robot; *Firebrand*.

The anchor watch was asleep, but woke as soon as he heard the scratching of BG's claws. *"Relax, I'm only a seabird,"* BG thought, hoping the man would go back to sleep.

But to his surprise the seaman thought straight back. *"Good, I thought it was one of those Frenchies. Would you like a biscuit?"* He rummaged in his jacket and fished out a piece of biscuit, which he held out to BG.

Not wishing to upset the sailor, BG stretched out his neck and grabbed the offering, intending to drop it over the side when the man was not looking. Robots do not eat biscuits. But curiosity got the better of him, even though robots are not supposed to be curious either. He tested the texture with his bill and was amazed to find that the biscuit was almost as hard as an iron bar.

"You have to dunk it in water first." The man was smiling.

"You actually eat this?"

"That and dried meat."

"Even Christopher Columbus fed his men better."

And from that moment BG had found a friend. They spent the entire watch passing nautical story thoughts. When the watch was relieved, BG was introduced to the next man, other crew members came to join in, and the story thoughts continued. He had somehow become the ship's mascot and although they must have noticed his one large leg, they were too polite to comment. Several had missing limbs themselves.

The *Firebrand* was a fire ship; an old vessel that was no longer much use as a fighting ship of the line. As soon as a fight started, it was to be set on fire and aimed at the enemy line of battleships. Just before the ship rammed an enemy ship and blew up, the skeleton crew were supposed to jump into the water. No wonder it had radiated minimal thoughts. It had few men on board to do any thinking and none of them had much to think about, apart from wishing to get home in one piece.

The small squadron of ships were part of the Mediterranean Fleet under the command of Shovell and were on their way back to Portsmouth for a refit after fighting the French. The admiral had received despatches brought by a fast frigate only the previous day and BG realised at long last why he was called a Frigate Bird. A fast and agile seabird which could snatch food from other birds in mid- air and dash out of danger in a flash.

The next day the fleet set sail for home and promptly ran into a storm. *Firebrand* managed to hold her position, because although short-handed, she was not weighed down with hundreds of tons of cannon and shot. The two largest ships were making very heavy weather and despite the gun ports being sealed tight shut, took on tons of water every time they rolled. The primitive pumps could barely cope and those manning them were soon exhausted.

BG wedged himself in a corner of the chart room and watched the navigator carefully. Not that there was much to watch. Every four hours, more or less, he marked his estimated position on a chart of the Eastern Atlantic. How he knew what the exact time was, or how fast his ship was sailing through the water, BG could not understand. The few thoughts he picked up suggested that the navigator had no idea either.

Then, after rounding the north-western tip of Spain they headed out across the dreaded Bay of Biscay, still sailing line astern in battle formation because they were in enemy waters. Who they expected to meet and how they expected to fight in such conditions was also a mystery to BG. But Admiral Shovell was no fool.

He had given the French Mediterranean fleet a thrashing and their Atlantic fleet, based at Brest at the top end of the Bay would be seeking revenge. They would know of his departure through their network of spies and could be waiting out there somewhere. Which is also why Shovell was in such a hurry. He wanted to get up into the English Channel and relative safety before the French expected him to. He was also concerned about the safety of the treasure. At least 10 chests of gold and silver were in his flagship's strong-room. Some of this was to pay his sailors and marines and some had come from captured ships and payments in return for safe passages or bribes.

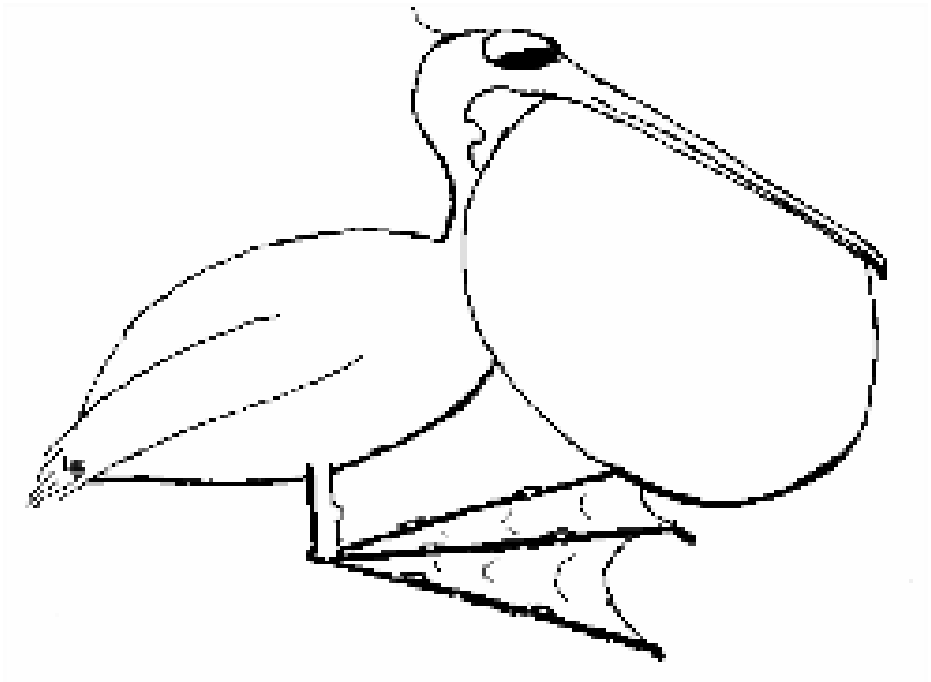
The fleet made very good time across the Bay of Biscay because the gale was behind them all the way, but now they faced a new danger, which both the navigator of *Firebrand* and BG could see coming days earlier. When to turn right and into the English Channel? Turn too early and they would be driven onto the rocks of the French coast. By the time they saw the land it would be too late to turn the unwieldy great wooden ships with the gale trying to blow them onshore. But if the fleet turned east too late they would run straight into the hidden reefs off the Scilly Isles, already the graveyard of hundreds of ships whose captains had made the same mistake.

Admiral Shovell, well aware of the danger, signalled the fleet to heave to and for the other ship's navigators to row across to the flagship to compare notes.

BG, knew exactly where they were of course, but this was nowhere near the position the navigator of the *Firebrand* had marked on his chart. Should he interfere or would the other navigators be better informed? He tried to pick up other thoughts and even attempted rather half-heartedly to communicate with the admiral from a distance, but had no luck.

Then BG's imaging problem recurred, but this time there was different software glitch. Now he was viewing an entirely different species of bird standing on its one foot on the deck.

He had seen a number of these peculiar birds paddling round the harbour in Lisbon; Pelicans; although this one's pouch appeared extremely large.



But why a Pelican? After some considerable thought BG concluded that this computer glitch must have produced an image of different species capable of puffing itself up.

Having eventually managed to erase the Pelican image, BG considered the fleet's position. They were safe enough at present, being well out from the French coast and almost level with the English Channel. If they turned right tomorrow morning they would be in Portsmouth two days later.

When the navigator returned from the meeting, he was wet but happy. He went straight to his chart and marked a ring round the last plot he had entered.

"Great," he thought to BG, *"Right on the button. We all agreed within a mile or two, so we must be right. We are to hold course for another two days, then to turn east into the Channel"*

BG hopped across and peered at the chart. *"The Scilly Isles are much further south than shown on your chart."*

"How do you know that?"

BG could hardly explain, so he thought *"Captain Edmond Halley discovered the true latitude of the Scilly Isles when I was with him years ago."*

"Wasn't Halley the man who had his navigator court martialled and dismissed the service for trying to warn him he was sailing in the wrong direction?" BG remained silent, detecting a degree of hostility creeping into the navigator's thoughts.

"Why don't you tell all this to the admiral, I'm sure he will be delighted to risk his fleet and fortune on the thought of a Frigate Bird!" The navigator was clearly displeased at having his expertise questioned and no more impressed with Halley's navigational expertise than Shovell had been. However BG was surprised that the naval charts had not been corrected.

"Turn right at first light or you will all finish up on the reefs of the Scilly Isles tomorrow night." But BG knew he was wasting his thoughts on the navigator who, like his admiral, had survived so many near misses over the years that he had become overconfident.

BG was never going to understand this crazy species. His orders were never to take life but when he checked again on the Controller's instructions he discovered he was not properly programmed to prevent the loss of life in the current situation.

Many years ago the Controller had thought him *"Continue to delay scientific advances in navigation or astronomy, but not if life is in danger. If in doubt, back off."*

BG, already confused by the imaging glitches, decided he was now completely bewildered, let alone "in doubt". So he decided to return to London rather than risk upsetting the Controller once too often. One of Shovell's scouting frigates would surely see the Scilly islands in time anyway.

It was a week before he intercepted news of the tragic Shovell disaster. Four of the great battlewagons, including the flagship *Association* had run straight on to the Western Rocks, outcrops of jagged reefs on the western corner of the Scilly Isles. Incredibly they had still been sailing at full speed, in closed-up battle formation line astern behind *Association,* on a wet and windy night, so dark that the stern light of the vessel in front was only just visible at 100 paces!

By ignoring Halley's data on the position of the Scilly Isles, data obtained with the instrument he had ordered Newton to destroy, Admiral Sir Clowdesley Shovell had been directly responsible for drowning over 2,000 of his men.

He had also lost all his treasure chests and his own life. Little *Firebrand* had been holed but stayed afloat long enough for some of her crew, including BG's friends, to reach a nearby island. But the navigator was not among the survivors.

18
1713 – 1726

Some years after the Shovell disaster BG began picking up thoughts on proposals for offering a prize for devising a foolproof method of determining longitude at sea. This might represent a threat to the mission especially as Sir Isaac Newton was somehow involved. He briefly considered having another crack at getting straight through to Newton, but decided to check on Halley first. Newton might be a dangerously brilliant scientist, but his mind was decidedly odd. BG had doubts about exposing his software to a Newton virus.

Halley was surprised to find the bright-eyed one-legged Frigate Bird on his doorstep and BG was surprised at the change in Halley. Smartly dressed, ginger hair neatly brushed and a sparkle in the eye that matched BG's. A far cry from the hard drinking young man or even the worried ship's captain.

"Hello," they thought together, *"Where have you been this time?"* So they spent hours catching up on their thinking, although BG did his best to give away no classified information. When BG came to the Shovell disaster, Halley could hardly contain himself.

"When I gave evidence before the Admiralty court of enquiry into the disaster, those old duffers tried to blame it all on the weather. Said an Admiral of the Fleet never made mistakes."

"But the accident was caused because the Admiralty charts had not been updated surely." BG realised he should not have known that, so hastily continued his thoughts, *"I understand the Great Comet now carries your name."* But this only made matters worse.

"You knew all about that comet. That old rascal Hooke had you figured out from the start. He realised you were chock full of information we knew nothing about. He was right, wasn't he?"

BG nodded.

"And if we waited patiently you would tell us."

BG thought, *"No, I am not permitted to. The data on the comet slipped out by mistake. I was still thinking about those accidents when I cut the boy's hand and ripped the sleeve from your jacket."*

*"*It was Halley's turn merely to nod, *"But I know now, and what harm can be caused by you giving me more information? I'm not going to use it to kill anyone or even to make a fortune for myself. It could be used to avoid others drowning."* But BG was not going to fall for that line, however persuasive.

"No harm from you maybe, but once the information becomes common knowledge, others would be tempted. Don't forget I've witnessed some terrible crimes on this planet over the centuries. And, I might add, your species is not improving."

Halley tried again, *"Newton has already produced a mathematical theory that covers the non-circular orbits of heavenly bodies and calculates their constantly changing speed. But until he can obtain reliable lunar orbit measurements from Flamsteed, he has no proof. He is afraid he might be wrong. Is he?"*

"I have no idea what his theory actually is."

But when Halley had finished explaining, BG realised that the mathematics of Newton's theory of gravity was correct and could be used to put rockets into orbit and wreck his mission. If they also had electricity, rockets, atomic clocks and computers that is. But he was very careful to think this very quietly and very very fast.

But once again he had almost given the game away. Halley detected the flash of thought and although he could not understand any of it, it told him Newton was almost certainly correct. Why else would this creature need to prevent him from intercepting its thoughts?

But the ever curious Halley was determined to extract more information from this mysterious one-legged bird. How did it know so much more about astronomy than either Newton or himself who were the acknowledged experts? Where had it come from and who would not permit it to divulge information on the trajectory of a comet?

Although BG was tuned in to these thoughts, he was not prepared for Halley's next move.

"As you must know, I have recently been designating numbers to all the major stars in each of the constellations. I think you might be somehow connected with one of those stars."

BG thought absolutely nothing, so Halley continued.
"Now I wonder which one?"
Still no response from BG.

"That single leg; could that be the key?"
Still no response.

"You see that extremely bright star below the three close together which we call The Belt of Orion the Hunter?"

BG nodded, but still managed to otherwise remain thought blank probably because he was concentrating solely on preventing his red pouch from inflating and seriously jeopardising the entire mission.

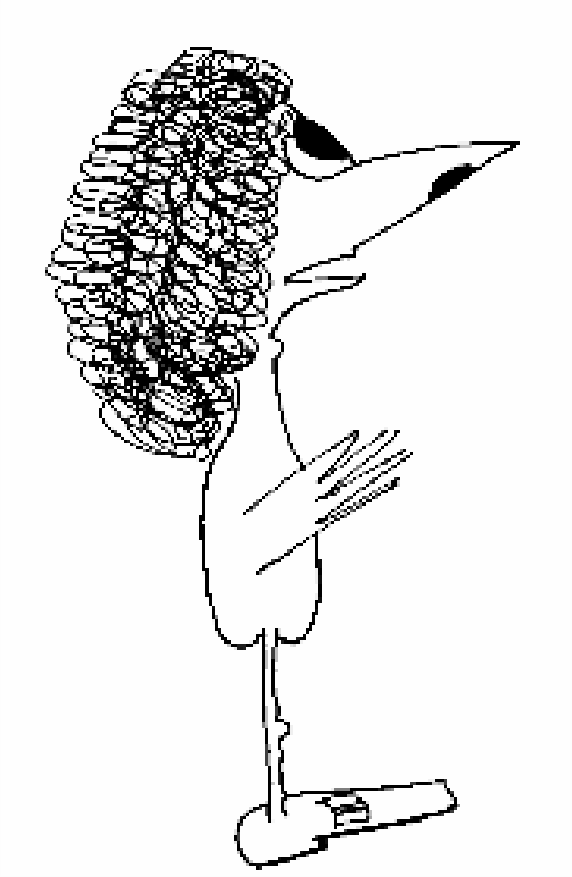
"I have named it 19 Orionis, but the name given it by Arab astronomers was 'The Foot of Orion' or Rigel meaning foot. You have one prominent foot so I suspect you are somehow linked with that star. Am I right?"
"No, you are incorrect; I have one foot because of a fault in manufacture."
BG was being as economical with the truth as the Controller usually was. Although his foot fault could surely have nothing to do with Rigel, the mission certainly had everything to do with that very bright star. Rigel was their home sun!

Knowing little about the proposed longitude prize, BG moved from the dangerous ground of his origins and hastily thought a clearly disappointed Halley to explain.

Apparently the English parliament had asked Newton, now the President of the Royal Society, to draw up the rules for the prize. Newton was proposing that the government offer a reward to the first person to make a practical device for determining longitude at sea, citing the Shovell disaster as the reason for offering a prize worth a king's ransom.
"But the disaster was caused through Shovell's stupidity." BG suspected there was more to this story.
"Of course, but the public don't know that and the cash inducement will produce all sorts of new navigational inventions and must eventually solve the longitude puzzle."
"Which would be another failure for the mission unless I can discredit the prize" thought BG very rapidly.

Although BG's concentration had lapsed at last, Halley, still thinking about the wording of the prize rules, for once failed to register BG's thought.

The next day BG headed straight for the Royal Mint; he had to visit Newton, virus or no. Again he landed on the thatched roof with a clatter and again he had to stamp out the flames. This time Newton would pay attention; the powerful thoughts he was about to transmit would be irresistible.



Newton walked slowly out into the courtyard and looked up at BG who, once he had rid his imaging system of a picture of Newton as a half-bird-half-human, immediately began an onslaught on the scientist's brain.

"The longitude prize you are setting up is a swindle; you ought to be ashamed of yourself. What will people think of you when they find out you intend using your angle-measuring device to claim the prize yourself?"

Before Newton could think a suitable reply, BG continued his powerful thoughts. *"The prize will double your already massive fortune; pure greed."*

But Newton was not to be overpowered so easily.
"Rubbish, if that is that one-legged bird thing on the roof thinking. Admiral Shovell cost me a fortune by putting my wonderful invention and metal-working discoveries on the secret list. Now I intend to recoup some of my losses."

BG did not bother to point out that Newton had been adequately compensated by being appointed Master of the Mint and continued transmitting at maximum power.
"Unless you include a paragraph in the longitude prize rules which states that the prize cannot be awarded to any device which has already been invented, I will think to Queen Anne that you are intending to win the prize yourself using an instrument which is a state secret."

With that thought, the Great Frigate Bird God launched himself skywards and disappeared rapidly straight up into the clouds leaving a very worried Newton watching as the thatch caught fire again.

After a sleepless night Newton sensibly decided to include a sentence in the longitude prize rules which excluded his invention.

A week later Newton received another burst of powerful thoughts, although the one-legged bird was nowhere to be seen.
"You have not yet decoded the cryptic longitude prize claim you received from Sir Christopher Wren; even if you think you have."

Assuming that the thoughts were coming from BG, Newton wondered how the pyromaniac knew about that letter. However he believed he had decoded it. Better think very quietly on this one; but as usual, not quietly enough.
"I watched you yesterday; you were pacing the courtyard reading Wren's longitude claim. Treat all three lines as one long message and study the flaws." Giving Newton no time to think, BG continued, *"Your brilliant subconscious thoughts will be revealed by examining old biblical texts. They will take some discovering but with your knowledge of ancient languages you should eventually be successful."*

"So there were gems of knowledge in my brain waiting to emerge," thought the great man. *"Pretending to converse with a weird bird will indeed unlock them."*

For many years BG, still sporting his Frigate Bird outfit, his blushing days apparently over, was a familiar sight amongst the Oxford University colleges, keeping a watchful eye on the activities of Halley, now the senior tutor of Geometry.

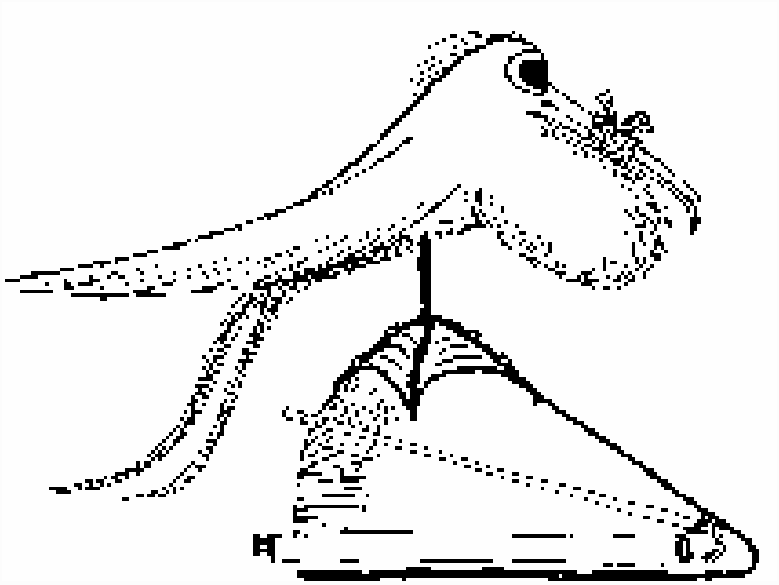
When Halley became the second Astronomer Royal in 1720, taking over the job the moment Flamsteed died, BG moved his headquarters to Greenwich Observatory. He visited the site where he had undermined the foundations to the wall all those years ago and was annoyed to discover that his sabotaging efforts had been repaired.

Halley had already laid new foundations and rebuilt the entire wall and the work had been done so well that BG could not have damaged it again without it being obvious. Certainly the new Astronomer Royal would need to be seriously thought to in the very near future!

Oddly, despite the huge value of the Longitude prize, not one single even half-sensible suggestion or invention had yet been put forward. There had been dozens of completely nutty ideas, many of which hit the headlines, but none of which were worth more than a moment's thought to the examining board.

But BG was becoming increasingly worried over the Newton twin-mirrored marine quadrant invention although the man himself had ceased to be a problem. He had taken the thought and was now spending all his time examining ancient manuscripts, surrounded by ever increasing piles of texts and thousands of scribbled notes.

So concerned was BG that he began having vision problems again. This time he was imagining himself as the guardian of Newton's secret invention. At least he was visualising himself in his correct Frigate Bird outfit rather than a Pelican. The sooner he could contact the Controller the better.



Newton was by now an old man and when he died someone was sure to resurrect details of the instrument. After all it had been exhibited at a Royal Society meeting back in 1699 and dozens of sailors must have seen Halley using it. BG decided that now was the time to try a spot of blackmail on Halley by using the reverse of the threat he had employed against Newton

"Have you considered what would happen if anyone discovered the way you cheated the public over the Longitude prize?" Halley turned away from his telescope and looked at BG.

"Cheated?" What was the weird bird up to now?

"I'm up to pointing out that no one can win the prize because of the clause which prevents an instrument already invented from competing. Yet the prize cannot be won without the assistance of a marine quadrant. You helped Newton draw up the rules and you knew about his invention so you must have known no one could ever win the full prize. If anyone ever discovers the details of Newton's quadrant or even the working drawings, you, the new Astronomer Royal, will be accused of helping set up a fake prize."

"Newton was the instigator, not me." But Halley knew that Newton was sick and it was he, along with the Admiralty who might carry the blame.

19
1727 – 1743

Unable to make contact with the spacecraft, BG decided on a spot of standby mode. In any case little progress on the longitude front could be expected in the near future. Yet another mistake, this time because meanwhile Halley had confronted Newton and been given the marine quadrant, its written description and the original drawing. These he hid away carefully and quite deliberately did his best to erase the entire subject from his memory.

BG came awake with a start, defence mechanisms primed. But it was only Halley's finger tapping gently on his foot.

"I thought you might like to know that Newton has just died and there is to be a service in Westminster Abbey."

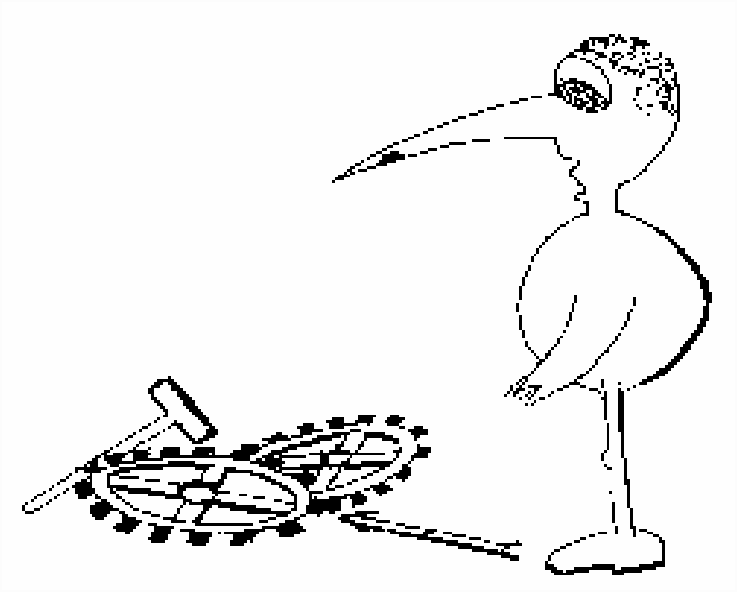
"What happened to his instrument?" BG was certainly no longer in standby mode but Halley had been quite successful with his mind control exercises. He simply shrugged his shoulders.

In 1730 a clockmaker by the name of John Harrison travelled nearly two hundred miles to London by uncomfortable stagecoach from his home in Lincolnshire. On the roof of the coach was strapped a large trunk and in the trunk was a large wooden clock. The man then spent weeks trying to arrange appointments with members of the Longitude Board. None could spare the time to talk to a man who dressed and spoke like a country yokel. A clock alone could never solve the longitude problem any better than earlier proposals such as barking dogs or ships anchored all across the Atlantic that fired cannons every hour would do.

After spending the best part of a month in London the clockmaker packed his bags and clock and took the Dover coach as far as Greenwich. This was his last chance. If the Astronomer Royal refused to see him, he would go back home and concentrate on making church clocks and furniture.

When he was introduced to Halley, he was surprised to find a large odd-looking one-legged bird with a red breast perched on a bookcase peering down at him. Very disconcerting when one is about to demonstrate an invention that will hopefully make your fortune.

By the time the trunk had been unpacked and the large clock set ticking, Halley and BG both knew Harrison's attempt on the impossible-to-win prize would never even be considered for a research grant.



This monstrosity was inferior to the beautiful clocks and watches made by Tompion and Halley's friend George Graham, none of which worked well at sea. BG decided he should encourage this line of investigation for the sake of his mission.

"Don't put him off." BG thought quietly, trying to rid himself of his latest image glitch and Harrison, not expecting any thought transmissions, picked up none.

"Well Mister Harrison, I must say that the idea of the special wooden construction to allow for temperature and humidity changes at sea is quite remarkable." Halley imagined having this contraption in his cabin aboard ship and wondered if there would be room for anything else.

"This is only a prototype, but I am a poor man and to make improvements I need a cash advance. Do you think the Longitude Board could help?" Halley was about to politely turn down that suggestion when he picked up another brief quiet thought from the bird on the bookcase.

"Pass him on to Graham."

Halley accepted BG's advice. "I will write you a letter of introduction to my Royal Society colleague George Graham the famous watchmaker. He's an honest man and may be able to help."

So Harrison repacked his clock and trundled back to London. There he introduced himself to Graham and they promptly spent half a day discussing technicalities. BG, still concerned about conserving power, did not eavesdrop on the conversation. Had he done so, he would have realised he might well have made yet another mistake.

Further developments on the marine measuring device front put BG's mission under threat for a second time within a year.

A vice president of the Royal Society, the telescope maker James Hadley, read a paper to the Society explaining that he had just invented a double-mirrored angle-measuring device. It bore remarkable similarities to the Newton design but was made of wood and obviously primitive. Even so in other circumstances James Hadley would have been accused of stealing Newton's invention but in this peculiar instance Halley could say nothing without giving the game away over the Longitude prize swindle and breaking the terms of the official secrets act.

Later in the summer of that same year, 1732, a letter from America was delivered to the Astronomer Royal by a ship's captain. More bad news for the mission.

Halley opened out the closely written sheets of paper carefully and a smaller piece of paper fluttered to the floor. BG, from his usual position on the bookcase, registered all the details of the drawing even before Halley had bent to pick it up.

"Another crude twin mirrored measuring device I see." But Halley was busy trying to read the letter; a difficult exercise because every scrap of each sheet was covered in writing. Only when he had finished did he think a clear reply to BG.

"And as you have no doubt already absorbed, this is a claim on the Longitude prize from Thomas Godfrey, a window-glass fitter from Philadelphia in America." Halley waved the diagram in front of BG's beak, clearly annoyed.

"So now you have two of them, neither of which is any good. Why worry, reject them both." BG was being a trifle optimistic.

"You saw the date on this letter and read that this instrument had been tested before Hadley had even invented his version."

"So?"

"When I inform the Royal Society they will have to publish the details and my colleague vice president John Hadley will be made to look a fool."

"Don't tell them then."

Edmond Halley, Astronomer Royal, Royal Society vice president and influential commissioner of the Board of Longitude, took BG's advice and told no one.

Then the Admiralty arranged for Hadley's "new" invention to be given sea trials aboard one of their small coastal vessels, *HMS Chatham.* Much to Halley's embarrassment they appointed him to oversee the tests.

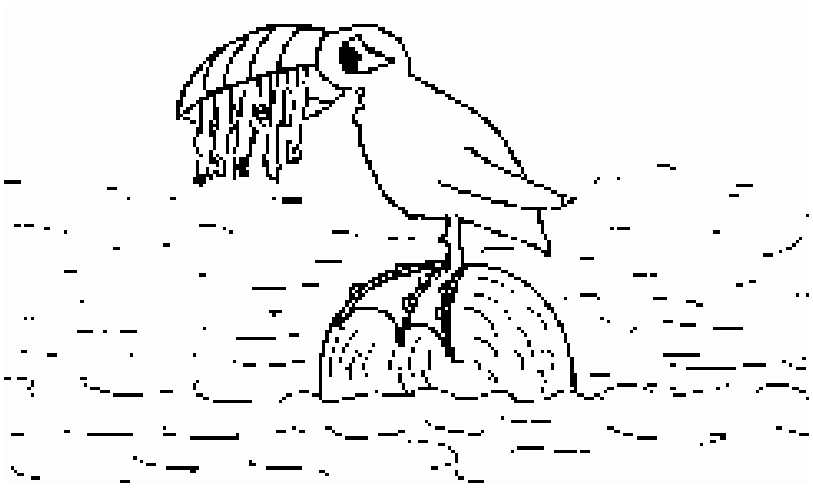
"Hadley's instrument is not going to pass the test is it? BG was perched on Halley's bookcase as usual and the Astronomer Royal was looking and thinking in a decidedly unhappy manner.

"No, it really is rather primitive. Poorly constructed and unevenly graduated. Anyone who possesses a pair of dividers can discover that."

"Why not let his instrument pass the test? That way Godfrey's supporters will be silenced because his instrument certainly cannot pass a proper sea trial either."

BG decided he would keep well away from the sea trials following yet another image glitch. Whilst Halley was thinking him the details of where in the Thames Estuary the trials would take place, BG suddenly saw himself perched on a channel marker buoy.

Not as a Frigate Bird but as a Puffin; a Puffin with one large foot and a huge gaudily coloured bill. A bill at least three times the size of a normal Puffin's large bill. First a Pelican with an inflated pouch and now a Puffin with inflated beak full of fish.



The mysteriously brilliant results of the *HMS Chatham* sea trials were hastily published by the Royal Society but BG detected Halley's worried thoughts and did his best to put the man's mind at rest.

"You did the right thing; the Admiralty gave you no choice."

"But I approved a set of fudged results which were impossible for Hadley's instrument to achieve. And worse still, I stood silently by while they altered the figures."

Although BG understood both reasons for Halley's discomfort, the published dishonest results suited his mission too well to let Halley change his mind.

"The Admiralty is satisfied because even though the French will now be able to copy the twin mirror design, they will soon discover that without Newton's secret metal-working technique the instrument is dangerously unreliable." Halley nodded silently.

John Hadley then took out a patent on "his" invention and become famous for being the (third) person to invent the marine quadrant.

Navigators and astronomers believed that assessing one's longitude at sea was now almost within reach and all that was required was a set of accurate advance prediction tables of the Moon's movements, plus of course a good head for figures. But they soon discovered the Hadley device was not nearly as accurate as the *HMS Chatham* tests had claimed.

Some years later BG noted Halley was well on the way to publishing those advance prediction tables of the Moon's position in the night sky; not accurate enough yet but close. So for want of anything else to interfere with, he decided to threaten Halley again.

"If you produce these prediction tables, John Hadley might try to claim half the great longitude prize and you won't be able to prevent this because you certified his instrument was accurate. Then Godfrey's friends will claim he had been robbed and there will be a parliamentary investigation."

BG, perched on the bookcase, eyed the old Astronomer Royal as his face turned a bright red, this time in anger. Had he gone too far?

"You're never satisfied are you?" Halley shouted, his famous temper once again getting the better of him. *"You are trying to make me abandon my life's work. You've threatened me once too often."* He picked up a book from his desk and flung it at the one-legged Frigate Bird with all the strength of his pent-up frustration.

A tiny blue spark flashed towards him as BG shot upwards to avoid the book. Halley collapsed onto the floor, twitched once and lay still. The second Astronomer Royal, aged 87 was dead.

Although this solved BG's immediate problem, his software was again in conflict; this time he really was entirely responsible for taking a life. BG determined that he could take no further part in trying to fulfill his mission until he had reported to the Controller which, even if all went well, would not be for at least 15 years. But to tie up loose ends and at least show the Controller he was a thinking robot, BG would have liked to have discovered the whereabouts of Newton's instrument.

Halley had managed to avoid thinking anything about it in all the years BG had been in close attendance. Perhaps Newton had melted it down or maybe Halley had kept it hidden somewhere?

Whilst attending Halley's funeral at a respectful distance, BG intercepted thoughts between Halley's two daughters. On Halley's instructions the daughters had placed Newton's wonderful brass measuring device in their father's coffin.

Although he was now assured that Newton's instrument would remain undiscovered unless someone desecrated Edmond Halley's tomb, BG was sure that the old Astronomer Royal had been deliberately thought absent and may have been hiding more from him than just the instrument.

So BG decided to return to his roost in Halley's room at Greenwich and await developments. He had been perching on a book case in his Frigate Bird outfit for so long that no one would be surprised to find him still there.

Within days another of the Royal Society's vice presidents, William Jones, walked into the room and began rummaging through the papers in Halley's desk, ignoring BG completely although they had briefly thought-communicated in the past.

Jones was obviously searching for something and having looked closely at every document in the desk without success, he turned to the books in the bookcases, starting with the one BG was perched on.

"What are you looking for?" thought BG and Jones jumped back in surprise.

"Oh nothing in particular," he said but thought, *"Anything written by Newton."*

"And if you find something, what then?"

Well aware of BG's reputation, Jones gave up the pretence and thought, *"I collect Newton material. He wrote reams of notes and many have never been properly examined."*

Jones began flicking though book pages which seemed to BG to be an odd way of searching for hand-written notes, but he thought nothing. Having checked nearly every book in Halley's library, out of a copy of Newton's "Principia" fell two small scraps of paper. Unknown to BG, Newton had given these to Halley following BG's threats over the Longitude prize swindle.

Now as Jones bent to retrieve them, BG rapidly scanned both before Jones folded the notes and pushed them hurriedly into his coat pocket.

"Nothing very important, but I'll let the Royal Society have the details for the record," and without another thought, Jones turned to leave.

"Nothing very important? How many Newton drawings have you ever seen?" BG had noted that on one was the drawing of Newton's marine quadrant and on the other was the written description. BG delivered a powerful thought.

"*Read out Newton's description to a Royal Society meeting and give them the text. Keep the drawing but never show it to anyone. Otherwise I will expose you as a thief."*

Jones read the description carefully and then studied the drawing. *"But the description refers to a diagram and makes no sense without it. Someone is sure to ask where the drawing is"*

"Of course. Now draw a new diagram which makes the instrument appear useless and present that to the Royal Society to go with the text." So Jones copied the drawing, making the odd adjustment in accordance with BG's advice and retained the original.

In 1742 the Royal Society published Newton's description of his marine octant together with a drawing of the instrument. The drawing depicted an instrument which was so large, heavy and poorly constructed that it would have been utterly useless.

Of course Newton's written description did not match the drawing although everyone pretended not to notice and Hadley's patent for his vastly inferior instrument had been protected.

Another successful mission.

20
1758 – 1773

The Controller was suddenly activated, pushed all the right buttons, lifted the spacecraft off the Moon's surface in a cloud of dust and resumed polar orbit, totally unaware of the drama which had been unfolding down below during the past 76 years. BG was contacted and ordered back into orbit but the downloading and processing of all BG's data, despite it having been edited here and there by BG, took a long time.

It took the Controller a lot longer to come to a decision on what, if anything, to do next. Although BG's report on the imaging glitch was particularly puzzling, the Controller decided to ignore the problem.

So first it produced the next version of Little Stalk from the internal replicator. Then, having reflected again on the various versions of BG that had been produced, the Controller was no longer in any doubt. Somehow the replicator had indeed been programmed to select each new design so as to be most effective for the next operation; BG had been right.

"It would be best for all of us if we obeyed our programmed instructions," it decided. *"Who knows what nasty little surprise that programmer might have planned for any robots that disobeyed orders?"*

Little Stalk nodded but was by now so familiar with a whole succession of *"nasty little surprises"* that it doubted if one or two more would make any difference.

"You seem to have been busy and quite successful this time BG."

The Controller had run carefully through the report of its representative on Earth a second time and gave every indication of being impressed.

"They are certainly on the wrong track with that primitive timer. Newton seemed to have made some real progress but fortunately he's dead."

BG was drifting near the external replicator, his red chest clearly visible and this reminded the Controller of the part in the report that

mentioned Halley's ginger hair. While it was collecting these thoughts it realised BG was transmitting.

"Quite successful, apart from killing people again, you mean? I quite liked that man Halley."

"Your main disc reveals that your defence spark never reached the man. Halley died because his heart gave out. In any case he came very close to discovering our origins." The Controller moved on hastily.

"Now pay careful attention BG. This concerns your next assignment. I have discovered the replicator has been pre- programmed to produce versions of you that are ready to deal with specific events before they happen as we suspected."
BG interrupted *"We? I thought this when I was given a springy leg and you took no notice."*

The Controller ignored BG and continued thinking. *"You are also placed in the right location in time to disrupt the next threat to our mission before it gets out of hand."*

Advanced logic linked with long range event prediction was not really BG's speciality but he suspected the Controller was no expert either. *"You mean like dropping me into the middle of the Fire of London and what about my imaging glitches?"*

"The fire had not spread to Hooke's house when you left us and your glitches might have been pre-programmed."
"Pre-programmed?"

The Controller's thoughts then blanked out and BG out of curiosity allowed himself to drift closer. *"What are you up to this time? What has Little Stalk been turned into?"*
The Controller pushed Little Stalk into view. *"Nothing, look."*

A black object with the usual large eyes and beak peered out at him. *"What is it?"* BG guessed the Controller would have no idea.

"I knew you would ask so I checked with my latest updates on Earth life forms. It's a very nice black Raven. Highly intelligent; walks rather than hops and can fly upside down."

"You mean I have two legs this time. I don't believe you. Hold up Little Stalk so I can check." "No need, you will only have the one again. When I thought 'walks', I was referring to real Ravens obviously." The Controller's thoughts seemed decidedly officious.

"Great. Let me get this straight. I'm about to be changed into a one-legged walking hopping Raven so I can fly upside down which will prevent anyone or anything getting into space."

"You are just pretending to be stupid. All you have to do is to latch onto the up-and-coming astronomer or navigator who most resembles a black Raven." Yes, the Controller was most definitely huffy. *"Get into the replicator and then I will brief you properly."*

The Controller watched BG's departure with a degree of apprehension. Something was wrong with the colouring. The new version of BG was not quite the same as the Little Stalk version. BG had black wings and a black head but his body was grey. Not that he seemed to have noticed. Ah well, the replicator must have produced an updated version for some reason best known to itself. Probably because there had been rather a long delay between producing the internal test version and the real thing.

The orders were easier for the Controller to issue than for BG to comply with. Programmed with the Greenwich Observatory coordinates he discovered that James Bradley the new Astronomer Royal looked absolutely nothing like a Raven.

Shortly after this BG discovered that he looked nothing like a Raven either! The transfer of limited thoughts between an unusually thinkative local Sparrow and BG revealed that Ravens were glossy black all over and lived at the Tower of London. BG was, according to the Sparrow, more like a faded Crow than a Raven. Possibly one that had forgotten to moult that year, or one that had spent too many hours in the sun. *"Do Crows fly upside down?"*

"Why ask me, don't you know?" So the faded one-legged Crow or Raven downloaded the small amount of useless information he had collected at the next pass of the spacecraft, returned as instructed to the roof beams of Westminster Abbey in a sulky mood and refused to communicate with the Controller. Faded indeed!

A few years later BG idly watched a memorial service from his high perch. He had observed several over the years but this one was different.

This service was for Nathaniel Bliss, the fourth Astronomer Royal and in the front row of the congregation was a young man who, even from a distance, looked exactly like a faded Crow. A mane of glossy black hair, a clergyman's white dog collar and black suit, covered except for the sleeves by a grey cape. BG at once became alert and tuned in to the man's thoughts, which seemed to be focussed almost entirely on ambition. BG realised that here below him, standing head bowed, was the man who had just been appointed as the next Astronomer Royal. For certain the replicator did know what it was doing.

Back to Greenwich went BG, but out of curiosity he made a brief visit to the Tower of London on the way east. Gone were the old Royal Mint buildings but strutting about the lawns inside the high white walls were any number of Ravens. He wondered why he had never noticed them before.

"Could one of you please fly upside down, I'm curious."

But apparently none of them could even fly the right way up because their wing feathers had been clipped to stop them flying away. BG did a quick loop the loop just to show off and zoomed on his way.

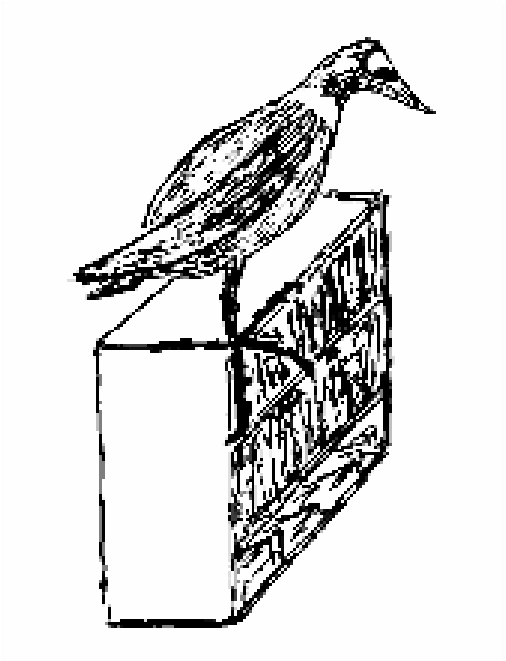
At the earliest moment he hopped into his old room and introduced himself to the Reverend Nevil Maskelyne, aged only 33 and already a fellow of Trinity College Cambridge, a fellow of the Royal Society and now member of the Longitude Board and, as if that was not enough, the fifth Astronomer Royal.

BG zipped up to his old place on the bookcase and clearly thought some introductions. *"I'm the latest version of the Great Ptolemy Bird God. The last version was a Frigate Bird when I was here in this very room helping Halley with his lunar measurements."*

Mascelyne had indeed heard of the thought bird, and already knew how to communicate. But was very surprised at this latest version.
"I understood that Halley collected his Frigate Bird from the South Atlantic on one of his trips. How come you have changed into a Hoodie?

"I thought I was a faded Raven."

"Think again you peculiar creature, you're a Scottish Hooded Crow. Why?"



BG peered closely at the Reverend Mascelyne, spending some time on each of the man's features. A final glance at the grey cloak hanging on a peg behind the door completed the un-thought reply and Mascelyne could only smile.

"So I gather you have now adopted me."

"Yes. How is the lunar work progressing?"

"Very well really. Now I'm Astronomer Royal, at last I can deal with that tiresome fool Harrison."

"The wooden clock maker?"

"Not so wooden my friend. A few years back I was appointed to oversee a trial of one of his contraptions for the Longitude Board. Had to sail all the way to Jamaica and it was only by a stroke of luck that I managed to prevent his clock winning part of the prize. Large and cumbersome, but no longer made of wood."

"Do you have the money to give him if he does win?"

"No, but Parliament will give him at least some of it. They think a clock will solve the longitude problem. Presumably you know this is not so?"

BG had to think quickly. *"Certainly a timer on its own can never determine longitude as I believe Newton told everyone years ago."*

"He did indeed." Mascelyne nodded and looked even more like BG.

"Then why not encourage Harrison. It can do no harm surely?" The same advice he had thought to Halley.

"Oh but it can. Harrison has already proved his latest chronometer is accurate at sea and many people mistakenly think he has already done enough to win the entire prize. But I've already published all the tables for finding longitude using the Moon's position measured with the latest Hadley marine instrument. Made of metal now and very accurate as I'm sure you know."

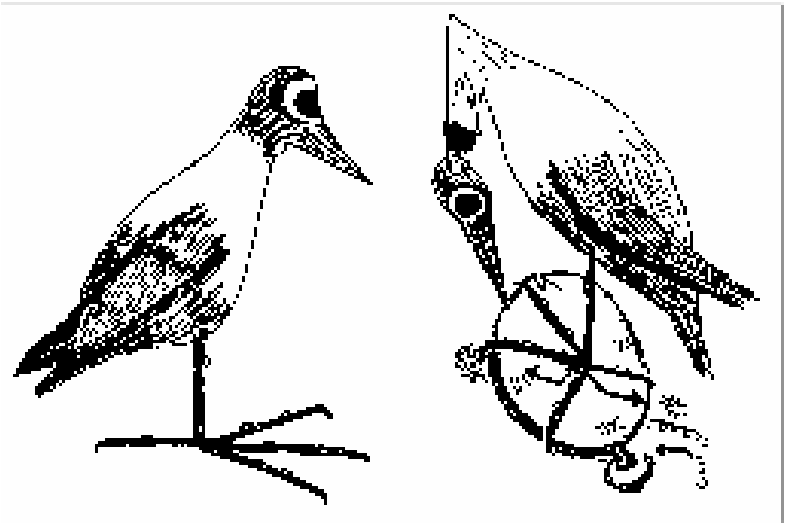
Mascelyne looked at BG, who nodded whilst quietly wondering how he had missed that one.

The other "Hoodie" was still thinking *"We don't need to waste money on very expensive watches, but Harrison has the king's backing, who has already persuaded Parliament to alter the prize rules so Harrison can win. If we are not careful, this observatory will be shut down."*
BG could hardly believe this. The Royal Observatory shut down? What a good idea. Perhaps he should make sure by encouraging Harrison.

Later that year BG accompanied Mascelyne to the house in London where John Harrison had agreed to strip and rebuild his latest prize-winning chronometer he called H4. He had agreed to do this in order to receive half the new longitude prize. He would then have to build two more duplicates to receive the other half of the money.

While Mascelyne and his cronies looked on and took notes, Harrison carefully dismantled his precious H4. Once the watch was in its hundreds of pieces, Harrison carefully put it all back together again. Mascelyne was clearly not pleased.

Whilst watching Harrison at work BG experienced another of his double visions which, as usual did nothing to help his concentration. At least he was not seeing a hugely inflated Hooded Crow.



"Now give me the watch and all your drawings" Mascelyne demanded and when Harrison protested, he was informed that he would not receive any of the money otherwise.

"How can I be expected to make two duplicates without the drawings?"

"That's your problem. Hand them over, or no money." Mascelyne looked more like a Hooded Crow than ever and BG determined to help Harrison if he could. Especially if it meant getting the Royal Observatory closed down.

Whist Mascelyne's attention was elsewhere BG thought quietly to Harrison. *"Give him the drawings, I've memorised all the details. Don't worry."*

Harrison had been eyeing the one-legged Crow with unease. Had there not been a one-legged bird of some kind in Halley's room all those years ago? But this one seemed to be telling him something.

"Go on, give them to the other Crow."

This time Harrison picked up the confidential thought order and grudgingly handed over his precious drawings.

A week later Harrison received a special banker's draft for half the prize money but a week after that the spiteful Mascelyne sent all the details of Harrison's H4 chronometer to Paris. This despite England and France being at war.

The French did not succeed in making a working copy because Harrison had by accident or with BG's interference, not included two essential items on his drawings.

When the French eventually discovered this, Mascelyne agreed instead to supply them with sets of the lunar advance prediction tables and the latest Hadley instrument designs to enable the French navy to navigate by "his" method instead.

21
1773 – 1779

BG decided to seek an audience with King George; the king would surely close the Royal Observatory now. But first he really must transmit all this to the Controller to let him know how well he was making out.

"You want to do what?" The Controller did not seem as pleased as BG had hoped.

"Tell the king."

"Just because your threat to tell Queen Anne worked with Newton it could be disastrous for Mascelyne. He will be executed as a traitor and you will have killed not one Astronomer Royal, but two and don't interrupt, I know Halley died of a heart attack but you provoked him." The Controller, now in full thinking flow, continued;

"In any case the king won't shut the Observatory, he's a keen astronomer. Even I knew that. Put things right. That's an order."

The spacecraft went out of range as the Controller lashed out at Little Stalk and BG was left thinking to himself. He had intended to lodge a formal complaint over not being made a Raven.

The one-legged Hooded Crow continued to perch on top of the bookcase in Mascelyne's office at Greenwich and BG spent most of his time glaring down at the Astronomer Royal. Mascelyne did his best to avoid eye contact because he was only too well aware of BG's thoughts. He had thought briefly of asking someone to remove the glowering creature but he had heard unconfirmed reports of supernatural powers. In any case he preferred to remain in contact. This way he at least knew, or thought he knew, what BG was up to.

BG was in conflict again. *"Put things right"* the Controller had thought him. Yet when he considered this order he was not at all sure there was anything wrong to right. These humans were still so far from endangering the mission that he could easily afford to go on holiday again. He really had enjoyed himself last time. Unfortunately this Astronomer Royal needed watching constantly, so the holiday would have to wait.

BG perched on the bookcase for so long that his shiny black head and wings became as dusty and grey as his body had been and the original grey body became a faded dirty pink. But as Mascelyne seemed to be fading in sympathy, no one noticed any changes. No one, that is until some years later a captain in England's Royal Navy and sporting a neatly trimmed beard, marched smartly into the room, saluted the Astronomer Royal, glanced round, spotted BG and burst into laughter. Mascelyne was not amused.

"Control yourself sir. That damned bird object is simply up there as an ornament. Friend of Halley's you know." Then he had a brainwave.

"I think you should take it with you. Might bring you luck and it could do with a spot of sea air."

"What about Forster's dog? It's quite a brute and it is sure to attack the bird. Could we tell him not to bring it?" The captain was hoping that Mascelyne would issue orders forbidding the naturalist to take his dog on the voyage but he was out of luck.

"Not a chance and it will not go within a mile of that dusty bird thing, I assure you. Let me check your chronometer."

The dapper naval officer carefully extracted an enormous engraved silver pocket watch from the depths of his jacket and handed it to Mascelyne. BG was amazed to see that it was John Harrison's H4 that he had last seen being re-assembled so skillfully years ago.

Both Mascelyne and the officer picked up BG's thoughts and the officer smiled. "No it's a replica. Made by the watchmaker Kendal. Works just as well, but the original is under lock and key at the Admiralty. They think the French might steal it."

Mascelyne was not given to blushing like Halley, but turned slightly greyer and did his best to smile. He reminded the officer of one of those vulture birds he had seen on his travels.

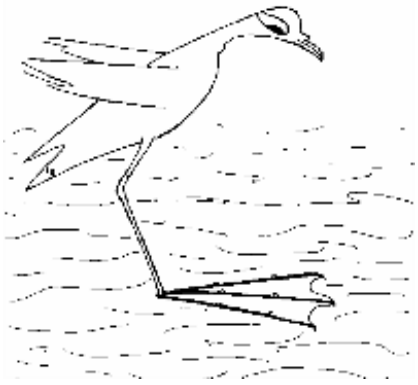
Mascelyne checked the watch carefully, wrote some notes and handed it back. He stood to shake the other man's hand. "Have a good trip and good luck with the research."

That is how BG came to accompany Captain James Cook on his second major sea voyage of exploration, research and discovery. From the very outset he determined not to interfere; merely to observe. He was not going to be responsible for taking any more lives he promised himself. He was going on holiday and nothing was going to spoil it.

Two small wooden sailing ships, the *Resolution* and the *Adventure*, set out from Plymouth with orders from the Royal Society and the Admiralty to find the great southern continent. They were bigger than the ships of Columbus and they were not quite so packed with people, but nearly. But they were much better organised. BG found himself a comfortable perch in the Captain's cabin and as always made himself at home. Why not, he was the senior officer in seafaring experience if not in rank.

BG soon discovered that Cook and the navigator both had orders from Mascelyne to use his lunar distance method of navigation at every given opportunity. Kendal's watch, which the Admiralty thought was to be used for this purpose, was only to be used as a last resort. BG gathered that Mascelyne would not worry too much if the watch fell overboard.

Many months passed and they were well into their voyage before anything exciting happened to BG. Trying to locate the mysterious fabulously rich southern continent, which everyone talked about but none had seen, was going to be a waste of time. BG could have told them that. At least the seabirds were interesting. There was one which fluttered across the waves with its feet pattering along the surface. BG watched these tiny birds for hours; in fact he watched for so long that at one stage the computer produced an image of a large version with only one webbed foot.



One day the expedition's naturalist Forster, spotted a large bird on an iceberg and shot it. He shot it because the species was unknown to him, which was how he discovered it was unknown to everyone else too. Except for BG and the long dead Tycho Brahe and Johanes Kepler. The unfortunate bird was a large Penguin and Forster promptly named it an "Emperor Penguin".

Cook gave it a long Latin name as well; *something-or-other forsteri*, which everyone forgot because it was unpronounceable. With the exception of the feet, eyes and bill, BG had been, like Kendal's chronometer, an exact replica of the real thing.

As BG was on holiday he refrained from thinking this to anyone, but he did wonder how the replicator knew what the poor bird was going to be named nearly 200 years before anyone discovered it. Eavesdropping on a conversation between Cook and Forster, BG discovered that the tiny seabirds he had been watching were called "Frigate Petrels". First a puffed up Pelican, then a puffed up Puffin and now a second type of Frigate Bird. There was clearly a new twist to the imaging glitches. BG decided to point this out to the Controller when least expected.

Despite being on holiday BG was again upset at this stupid waste of life. Soon after this incident there was another upsetting loss. Cook had become ill and was, according to the ship's doctor, suffering from a lack of fresh meat. So the doctor killed Forster's dog and fed it to the Captain, who then made a rapid recovery.

As time went by, so did the accuracy of Kendal's watch deteriorate. Twice Cook forgot to wind it properly and had to put it right by using Mascelyne's lunar distance method. So much for navigation by chronometer, thought BG to himself.

After Cook had become fed up with the bad weather of the southern oceans and given up looking for the southern continent, he turned north and headed for the island of Tahiti. This island had only been discovered by Europeans 5 years previously, though known about by the Albatross version of BG and his friends from Hawaii for a lot longer. BG also spent hours watching the albatrosses that were following the ship north. Their ancestors must have been his friends and he was reminded of happier times.

Then one day he realised that they had reached the exact spot directly opposite Alexandria where the Controller had once despatched him to. Not that this bit of the great Pacific Ocean looked any different to any other bit. But it made his mechanical mind up for him. Time to leave these adventurers and take a trip down memory lane. Perhaps his mind was becoming less mechanical?

Still ignoring the occasional fleeting request from the Controller to report in, BG abandoned Captain Cook and zoomed off across the Pacific, Central America, the Atlantic and North Africa and arrived back at the pyramids after a gap of over 2,000 years. He had intended to go straight to Alexandria but he was curious to see what had happened to the pyramids in that long interval since he had met Phocus.

BG was surprised to discover that nothing much had changed. The three pyramids were still standing and no one had tried to use the huge rectangular blocks to build something else with, even if more of the alabaster facing stones had disappeared. Most of the nearby Sphinx was now buried in sand and its face had been sandblasted by the desert storms. Presumably the Controller could still observe the outlines from orbit. BG waved a grey wing, knowing he was invisible, and headed for Alexandria.

When he arrived, he found it difficult to locate the site of the old library. Unlike the pyramids, here everything was different. The coastline appeared to have shifted position and the site of the library was, according to his navigation, now under a sand dune on the edge of a deserted part of the shoreline. Landing in a cloud of sand, BG scratched around with his foot and blowing with a thruster, unearthed part of the marble flooring and then stood firmly in the middle of it.

He closed his eyes and re ran the history disc very slowly. He ran it so slowly that his main computer misunderstood and switched BG into standby mode.

22
1798 – 1969

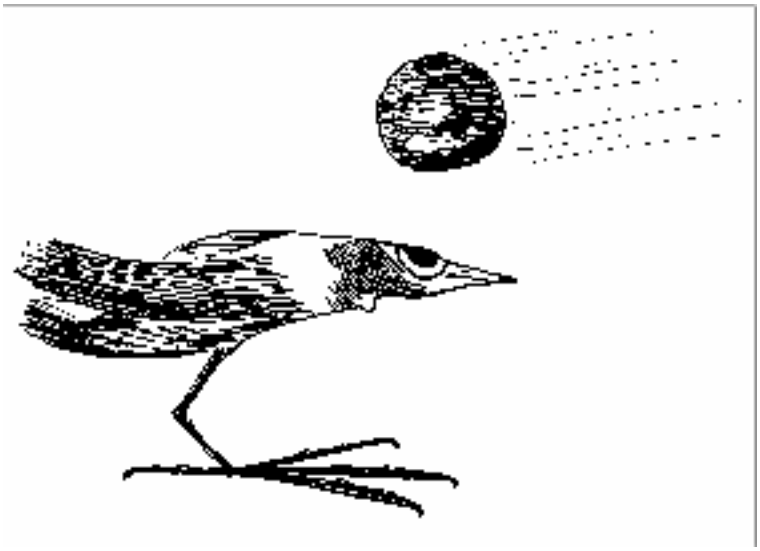
The one-legged mechanical Hooded Crow snapped awake with a start. Something had brought him to life rather suddenly. But what? BG peered about him, remembering the last time this had happened when that club-wielding man in a skirt had tried to knock his head off. Not a living thing in sight. He checked his monitors and discovered that a very loud noise and a minor earth tremor had caused his reactivation.

Perhaps an earthquake; but his sensors were still picking up distant abnormal noises from the north east. In the sea? So BG lifted off to an altitude of about a mile to check this out properly. There, laid out before him was an amazing sight. In a bay about 15 miles away, were dozens of sailing ships, many on fire and all apparently firing their primitive but deadly cannons at each other. There was so much smoke and confusion that BG could not tell who was fighting who, but one thing was certain. Those aggressive humans were killing each other yet again. His holiday dream of peace and tranquility had been shattered.

Should he send a report to the Controller? Should he buzz off somewhere a trifle more peaceful? Should he revert to standby mode? Being a robot which had somehow acquired too many human characteristics, BG did none of these things. Like curious foolhardy humans might have done in similar circumstances, he decided to take a closer look.

But the shock wave had caused a computer malfunction. BG began behaving as if he had been programmed to save life rather than simply not to take it. This now became his sole mission. All thoughts of the real mission were now absent. BG zoomed off in the direction of the fight, performed one full recognisance orbit, programmed the data into his action disc and found himself on the after deck of a large but battered man-of-war which was flying the tattered remnants of a white ensign. The vessel's name, clearly painted in large gold lettering across the stern, was *Vanguard.* Dead and dying humans littered the blood-soaked deck but most of the action was going on below. Every few minutes a huge salvo of cannon fire would blast out from the gun ports, rocking the entire ship, the deadly round cannon balls smashing into the gun decks of another ship which was

almost alongside. Obviously until recently the other ship had been doing likewise, but now only the occasional cannon fired back, although sharpshooters high in the remains of the rigging, were still firing at anything on the deck of *HMS Vanguard* that moved. Not a good place to stand, even for a small inconspicuous bird.



BG, still in battle mode, zoomed below and discovered to his horror that conditions here were even worse. Yet his computer had estimated that this ship was the ringleader of the winning side. What condition were the losers in? Tuning in to the thoughts of a group of officers crowded round an injured companion, he soon obtained his answer. The losers, the French, had already lost their flagship the *Orion,* the largest ship in the world until it had blown up when a fire had ignited its gunpowder store. That was the explosion which had activated BG.

He also discovered that the injured man was the admiral of the battle group and had already lost one eye and one arm in previous fights. He was now being attended to by the overworked ship's surgeon who was trying to stop blood from a head wound pouring into his admiral's remaining eye. He was not being very successful, mainly because the wounded man kept trying to get up. He obviously wanted to get on with murdering the opposition.

BG hopped boldly up to him.

"Stop this. Do you have to kill every last one before you can claim victory?"

Rear Admiral Horatio Nelson peered across at the odd looking bird. “Did it say something?”

“No I thought it, but unless you order an immediate cease fire, I certainly will do something.”

A flash of blue electricity sparked across the deck and drilled a neat hole right through the thick bulkhead behind Nelson’s left ear. This was followed by several more which drilled other equally neat holes in the bulkhead all the way round Nelson’s head.

Several seamen rushed forward to grab BG, but the moment a hand touched his feathers, another blue spark flashed out and the man fell to the ground.

“I will give you one minute to halt the fight.” BG was so furious that every man on the gun deck clearly received the unspoken message. Nelson, flap of skin still obscuring his vision, but not so badly that he had not seen the neat line of holes, gave the order to cease firing. To his credit he then immediately ordered any ship capable of carrying out rescue operations to do so immediately.

And that is how the great Battle of Aboukir Bay, the Battle of the Nile, was brought to a halt and how a great many lives were saved that otherwise would have been lost in the heat of a battle already won. A great victory for the English and the greatest defeat in the history of naval warfare for the French.

Belatedly the dusty Hooded Crow remembered he was supposed to be preventing advances in astronomy and navigation as a first priority. Clearly Nelson’s flagship, *HMS Vanguard,* now unable to navigate anywhere owing to the unfortunate loss of its main mast and most of its rigging, was not about to provide BG with any useful information. So, after a spot of thought collecting, he attached himself to one of the few English ships to emerge unscathed from the battle.

HMS Colossus was a 74 gun ship of the line, but she was old and now acted as the fleet supply ship and had not taken part in the battle. Her commander, Captain Murray was a personal friend of Admiral Nelson and one of the best navigators England possessed. Now he was in command of the search and rescue mission.

His resources were stretched to the limit because his ship was also involved in supplying all the replacement parts a battle-fleet might be expected to require. In this case there was not a lot he could do by way of supplying new parts because he never had any on board in the first place.

Most of the English ships were repairable and those that could not find masts, spars, rope or sails by cannibalising the wreckage of their less fortunate friends or foes were being prepared to be towed back to their Mediterranean base at Naples. Murray emptied his ship of supplies and spares, even giving up his main anchor. He then replaced the empty spaces with wounded sailors, both English and French and set sail for Naples. The first true hospital ship in the annals of naval warfare.

BG established a good thought relationship with Murray, again not difficult in view of BG's worldly high seas travels. The mechanical bird did not take to Naples which reminded him too much of Venice. Once Murray had discharged the less badly wounded, he set sail for England but ran into the same sort of bad weather that Shovell had experienced more than 90 years earlier. The badly wounded men, crammed into the gun decks like so many sardines, had a rough time. To prevent the ship from flooding, all the gun ports had to be lashed shut and they spent the entire voyage in darkness. A terrifying experience, even for hardened seamen.

All BG could do to help was to ensure that Murray knew exactly where he was at all times. Despite the poor weather conditions *HMS Colossus* arrived at the entrance to the English Channel in one piece, but then her troubles began. A rising easterly gale made it impossible for the tired old ship to make any headway on towards Plymouth. The experienced Murray turned his ship about and headed for a safe anchorage in the Scilly Isles; safe in an easterly gale that is. They anchored in the lee of the land and put out no less than three anchors just to be sure. Unfortunately three was all Murray had and two were small old ones connected to tired old hawsers. During the night the easterly wind swung right round to blow even more fiercely from the west, straight into the previously safe anchorage. One of the night watch was washed overboard and drowned and everyone on board could only hope that the anchors held. There was no way out of the bay for an old sailing ship full of seriously injured men. The captain did not even have any small boats aboard to ferry them ashore.

But Murray was no Admiral Shovell. He knew he had to get the injured off in case the anchors dragged or the hawsers broke. But how? BG solved the problem for him.

Two local fishermen were surprised when an odd-looking bird landed on the jetty. They were even more surprised when they quite clearly received an unspoken request for help.

The locals and the seamen from *HMS Colossus* between them got every single injured man ashore using the fishermen's boats. The last of the crew were just being ferried to the jetty when the best of the anchors broke a tine, throwing all the weight onto the two suspect hawsers. They snapped and *HMS Colossus* drifted rapidly onto the same reef that had sunk one of Shovell's ships all those years earlier.

Once the rescue had been completed BG disappeared and only later discovered what happened to the brave and brilliant seaman, Captain George Murray. The captain had to face a court martial for losing his ship but was exonerated, promoted to the rank of Admiral and knighted. Sometimes the Admiralty got things right.

The one-legged Hooded Crow, plumage faded was, rather surprisingly for a robot, extremely angry and confused.

"Never again. These humans are absolutely crazy. For over 2,000 years I have watched their scientific advances, trying to conduct the mission we were originally programmed for. For 2,000 years I have done my best to prevent scientific advances in navigation or astronomy.

For 2,000 years I have done very well and they have achieved little. But for 2,000 years I have also watched them develop methods of destruction which I was, unfortunately, not programmed to prevent. They eat each other, they blow up ships with thousands of their fellows inside. And worst of all they actually seem to enjoy doing it. Then my programming goes on the blink yet again and I find myself trying to save the silly fools.

Then that crazy admiral with more bits missing than me, rushes off to start another fight before his ship has been properly repaired from the last one. Never again." One of the longest thoughts ever transmitted by BG.

"You thought, 'never again', twice. Stop thinking and let me put you in the replicator for repair." The Controller, not having met anyone who had been on the receiving end of a ship's cannon, remained totally unemotional.

"No. Not unless you promise we can go home." In his distressed condition, BG had forgotten he had no home to go to.

"Maneuver closer if you can, then we can prepare for departure." The Controller, as usual was being economical with the truth.

BG did as he was thought and the external replicator sucked him in. The Controller brought all the external gadgets back inside and trashed Little Stalk so that it had enough room to plot its trajectory back to Rigel. But it had no intention of trying to locate its broken-up home planet when it got there.

The Controller needed to visit a different planet where it could obtain the special minerals needed to resurface the spacecraft. The lights warning it of the dangerously thinning coating had been blinking on and off since the last Moon landing.

The Controller then compacted everything else, including itself, and the probe flashed off towards Rigel. The ten month return journey finished in the middle of nowhere after less than nine months when the spacecraft's coating finally disintegrated and the tunnel of dark broke up.

The Controller was reactivated automatically and at once discovered its home star was still 125 light years away. More to the point, so was the planet it had to get to.

So for the next 166.66666 Earth years the disabled spacecraft limped at the much reduced speed of three quarters the speed of light towards its target.

By the time the probe had reached the planet, located the coating material and applied a fresh covering to itself, a grand total of 169 years had passed. No time at all to a robot, but a very long time in terms of scientific development back on Earth. The tiny spacecraft emerged from its latest tube of darkness quite close to the Sun, resplendent in its new coating and ready to resume its mission.

External gadgets once more sticking out all over the place and the Controller in charge and un-compacted, the spacecraft was set on a trajectory that would put it back in a high polar orbit round planet Earth.

Half way though its first orbit, the meteor “immediate impact” alarm sounded but before the Controller could take avoiding action two solar panels had been ripped off by a piece of space debris. Not a serious problem but the alarm was now sounding a “distant impact” warning.

The Controller hastily ran a computer check only to discover that there were hundreds of pieces of space debris accompanying the spacecraft in its Earth orbit.

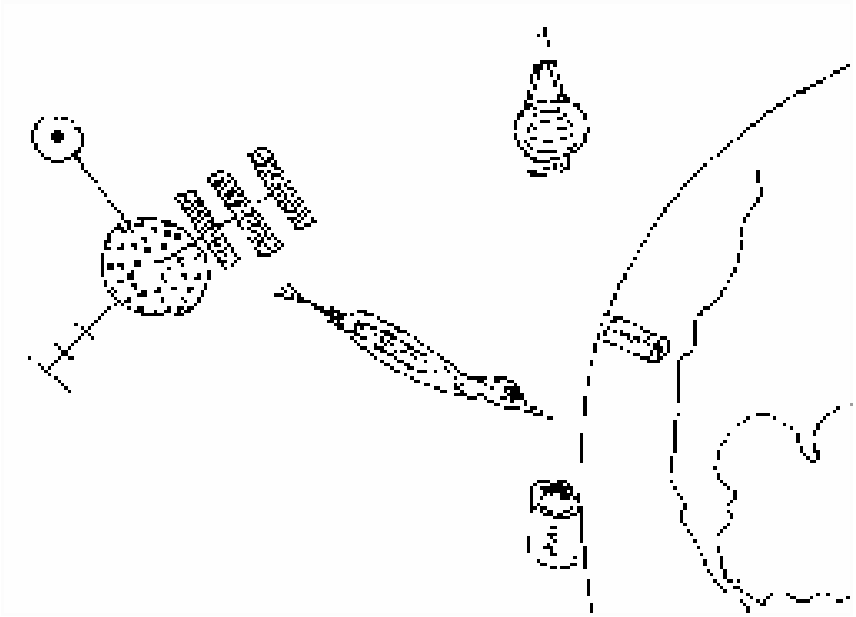
The detector unit should have checked for signs of space junk, satellites or spacecraft before going into orbit. That was the rule. Always check before approaching a planet where signs of life have been confirmed. The first time the spacecraft had approached Earth this had been done automatically but the software had not been programmed to repeat the procedure for later approaches to the same planet. A blunder that was really the fault of the long dead Boffin.

Further checks showed that the debris was in every case metallic and artificial. The Controller knew it now had to remove the spacecraft to a safe distance and observe. Those were the rules but again these orders only served to confuse. Removing the craft from possible danger would not permit proper observation in this case. So the Controller did two things instead of one.

The compulsory test of the replicator was carried out which produced the latest version of Little Stalk. The result was as usual kicked behind the star-plotting unit in disgust and the Bird God reactivated. Being by now something of an ornithologist, BG inspected himself as best he could and concluded he was now some sort of medium sized songbird, most likely a Starling. Still with all the usual abnormalities apparently.

Before BG could discover if his software glitches had been sorted out, he received very clear thought instructions.

"Get down there and find out what has been happening." The Controller then shot out of orbit, retracting equipment as it went, and headed towards the Moon leaving BG hanging in space. The Controller was taking the spacecraft out of harm's way as programmed and would check for external damage at a safe distance.



BG, high over South America at the time of his abrupt abandonment and lacking firm instructions or fully aware of the dangers, activated two thrusters and headed down towards Earth at a rapid pace. He missed a very large communications satellite by less than a wing-beat, which caused him to slow to a more sensible speed.

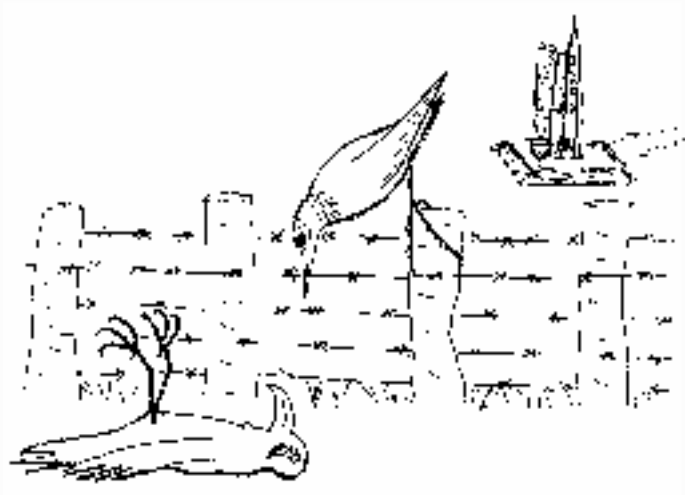
This resulted in a totally altered trajectory and instead of arriving in London as programmed, BG arrived in Florida. Right in the middle of Cape Canaveral just as a very large rocket was being prepared for firing.

One of the bird-chasing falcons kept at the site to prevent bird strikes on planes and rockets, spotted a Starling flying low across a field and had almost got within striking distance before being stunned by a small bolt of blue lightning.

23
1969 – 2017

Starlings were first introduced into North America from Europe more than 100 years after BG had last visited Earth. Some misguided human had released a small number in the middle of New York and now 60 years later there were millions of the noisy quarrelsome but intelligent birds spread across much of North America.

BG, apart from a missing leg, the large upside down foot and enlarged eyes, was unrecognisable at a distance as anything more sophisticated than just another one of those millions. But the falcon, which had just been zapped knew better. For a bird it was oddly thought receptive and BG wasted no time in communicating.



"Why did you attack me?" "
"My job."
Although receptive, having just been zapped, the falcon was not able to think more than one short sentence at a time without needing to recuperate.
"Which is?" BG realised that to get good results, he too would have to communicate in chopped off thoughts.
"To stop birds - rockets."
"Rockets?"
"Yes." The falcon staggered to its feet and fluttered unsteadily up onto a fence post, then nodded in the direction of the huge rocket whose external liquid oxygen tanks were giving off vapour in the afternoon sunlight.

BG did some rapid private thinking, aided by his data bank. A rocket on a launch gantry? The communications satellite I just missed on the way down? An awful lot has been going on since the Battle of the Nile.

"Do you know which human year this is?" A stupid think which was greeted with a glazed expression and a blank brain.

Later that day the massive rocket lifted off and disappeared up into orbit in a huge cloud of fire and smoke.

"Primitive but impressive," thought BG who had decided not to rush into trying to establish a relationship with a human until he had obtained more information.

That night he did at least discover how long he had been absent although it took him longer than expected. First he had to find somewhere away from all the thousands of electric lights in order to obtain a clear view of the night sky, in the course of which he was almost hit by fast moving vehicles - twice.

According to the planetary positions, his computer estimated that it was month 8 of the year 1969. This came as a complete surprise. Had he been a betting robot he would have thought the year would have been closer to 3969.

In less than 200 years the human race had developed from using wooden sailing ships, candles, horse transport and primitive mechanical timers to all this.

An urgent consultation with the Controller was called for, but BG knew he would have to wait for the repairs on the spacecraft to be completed. He found a suitable ledge on a skyscraper in the nearby very large city, tucked his head under a wing and went into temporary hibernation.

Meanwhile the Controller had placed the spacecraft in a parking orbit round the Moon while he retracted any remaining external units worth keeping and trashed the rest. Then he made an extremely cautious landing having scraped off some of the craft's special coating last time. Three days later, just as a new solar panel was about to be fabricated, the "immediate impact" alarm sounded again.

Before the Controller could even begin to take avoiding action, the entire spacecraft was covered in a thin film of dust as a primitive space vehicle, reverse thrust jets at full power, made a rather clumsy landing nearby. The Controller decided, like BG, to lie low and await developments.

The first human to land on the Moon's surface walked with great care but the second man to do so on that memorable day in the brief history of human space exploration took a golf club and ball out onto the surface. As the Moon's gravity was only one sixth that experienced on Earth, he intended to establish a world record for the distance a golf ball could be hit. Owing to the lower gravity and his cumbersome space suit, his first attempt ended in failure. The club clipped the top of the ball, sending it bouncing in the direction of the tiny spacecraft, picking up a lot of moon dust as it rolled.

But the golfing space-walker was determined on a double entry in the next edition of the Guinness Book of World Records; the second man to walk on the Moon and the longest drive of a golf ball. So he laboriously waddled over to the ball and took another almighty swing. This time he connected, but because he had not hit his golf ball but the tiny spacecraft which weighed at least 50,000 times more than his golf ball, all that happened was that the club broke and the astronaut sprained his left wrist.

Fortunately, due to his embarrassment he did not attempt to lift the "ball". Puzzled and muttering to himself, he decided that one entry in the record books would have to suffice.

As the Controller was picking itself up and hastily starting to initiate emergency lift-off procedures, the data that the Boffin's personal robot had passed to the robot Controller moments before its master was obliterated over 2,500 years previously, was transmitted in a long burst of high frequency data.

This was received by BG, the only robot within range that would survive this impending disaster. Then the self-destruct unit automatically scrambled the entire contents of the spacecraft before zapping the lot. The robot Controller ceased to exist.

An investigating spacecraft must not land on a planet where life was present on pain of total destruction. It was absolutely forbidden. But the Boffin's original computer software programme had made no allowances for the entirely unforeseen situation in which the life form arrived after the investigating spacecraft. A billion, billion to one chance; if not more. Why the self-destruct system had not deployed the moment the two humans set foot on the Moon will never be known, but the most likely explanation is that, encased in cumbersome primitive space suits, they were initially miss-diagnosed as robots.

Murphy's law reigned supreme and the rather small Great Bird God was rudely reactivated by that high speed data transmission whilst still perched on his one leg on a skyscraper's obscure ledge high above the hustle and bustle of Miami, Florida, U.S.A. But from the moment BG's computer had received its new data direct from the Moon, the one-legged mechanical Starling was a changed robot.

Not only did BG discover he was now in possession of the Boffin's brilliant mind but his software upload also told him that A/ the Controller had been eliminated and he was now in charge of an ENTIRELY NEW MISSION, B/ he had acquired a new miniature battery unit and several other pieces of specialist equipment and C/ he had inherited the replicator's ability to manufacture robots.

He also discovered that his imaging software glitch appeared to have been repaired and most of his abnormalities had been corrected. Normal sized eyes and beak but still only one leg. Then BG noticed his only foot was now the right way up; the knobbly bits were in their rightful place underneath. But why oh why did the Great Bird God in charge of everything still only have one leg? At long last BG discovered the answer.

It had indeed been the Boffin's brain that had instructed the replicator to produce each new image in a form that would best serve to advance the mission. Even the original Stork likeness had been carefully thought out. The single leg and large foot had resulted in BG being accepted as a god; just as planned but the upside down foot seemed to have been a mistake.

BG ran checks on all his software and discovered one or two bugs which he could not correct; the Boffin's brain appeared to be in overall charge.

How could he still exist on a planet where there was life without being automatically scrambled, even though he was now the mission Controller and no longer the local robot representative? His data bank explained that the preservation of the Boffin's brain had priority over self-destruction.

Another puzzle was explained when BG discovered that the Controller, the previous guardian of the Boffin's brain, had operated on a need to know basis and often kept BG out of the loop. The crafty robot had somehow persuaded an Arab astronomer to name their home star "The foot of Orion" so as to reinforce BG's reputation as a one-legged god. The Controller had also influenced the naturalist Foster to name his newly discovered penguin "Emperor" for similar reasons. BG even discovered that the Controller had worked out how birds navigated back in the days of his Woodpecker guise.

What about the new software that in theory would allow him to manufacture robots? Here his data bank suggested this ability was limited by access to suitable materials but would not explain how these would be produced or in what form.

So BG ran a practical test, deciding that he would reproduce a rat similar to the ones he could see scavenging in a garbage bin more than twenty floors below. A small opening under one wing expanded rapidly and out popped a perfect replica of a Starling having two legs. In fact it looked exactly like a real Starling.

"Hello" thought a puzzled BG, *"welcome to Earth."*

"*What happened to your other leg?"* came the thought reply.

BG decided to ignore this particular robot and try again. This time using the image of a cat. Out popped another perfect Starling! Now he had two of them perched beside him on the ledge.

"Hello" thought BG once again, *"welcome to Earth and don't ask me where my other leg is."*

The second replica turned towards the first replica and thought "*what happened to its other leg?"*

Now BG understood how the Controller felt about Little Stalk's cheeky antics, but lacking a plotting unit or an ability to lash out without toppling off the ledge, he simply lifted a wing and sucked the

insubordinate robot in through the replicator nozzle, which strangely made him feel much better. The first robot Starling switched hastily into standby mode. It made no difference; it too was sucked in.

In theory BG could now populate the Earth with thousands of undisciplined mechanical Starlings provided he could obtain enough material to keep his replicator unit supplied; otherwise this new mission would be no sinecure.

For decades BG traveled the world, draining the thoughts of scientists, politicians and industrialists at every opportunity, all the while waiting for the perfect moment to begin his new mission.

Following the euphoria of the first Moon landing which had destroyed his spacecraft, most of the human race began to realize that scientific achievements were not always in their best interests. In 1979 a core meltdown in the Three Mile Island nuclear fission atomic power station sprayed a cloud of dangerous radio-activity over a wide area of the eastern United States and seven years later the Chernobyl atomic reactor exploded with even more disastrous consequences for much of Europe. Safety was then improved, but still no one had devised a safe method of disposing of the radio- active waste.

Those scientists not employed by aerosol or refrigerator manufacturers had for years been warning anyone who would listen that massive man-made gas leakages were damaging the atmospheric ozone layer and increasing ultra-violet radiation levels dangerously. Scientists not employed by the automotive industry were vainly pointing out that atmospheric pollution was also being caused by such things as car exhaust emissions. This was creating global warming. In turn the ice caps would melt, sea levels would rise and a good proportion of humanity would starve or drown. Politicians and industrialists declined to take note.

Man-induced disasters during the years 2008 and 2009 provided BG with the ammunition he was waiting for, just as the Boffin had anticipated. First, the latest expensive nuclear fusion research project broke down the moment the chief scientist pushed the start button; without any help from BG. Then the world financial markets crashed sending the human economy into decline. This was followed by the discovery that the ice caps were melting far faster than expected.

Then two satellites collided head-on, spreading debris throughout Earth's entire orbital region, endangering future space missions and putting global navigation and communications in jeopardy.

Lifting a wing, BG's replicator produced an imitation Starling with two legs. This robot was immediately thought to somewhat severely. Now that he had a safe haven for the Boffin's brain in the event of something nasty happening to him, BG could begin the mission.

"Your communication sign will be Two Legs. No thinking me where my other leg is, no going off sightseeing, no thinking anything to humans that they don't know already." Two Legs was just about to think something but BG cut it off.

"Before you think me that you don't know what they know already, you will find all that in your software." Two Legs was sensible enough to merely nod.

"Now pay attention. Our mission is to prevent the human race from wiping every living species on Earth – including themselves.

Two Legs was confused. *"I can already understand how the humans can easily wipe out all life on this planet, so why not just get rid of the humans to protect all the others"*

"Because the Boffin programmed us never to take life. Unfortunately I don't think he could have anticipated us coming across an inhabited planet on which the superior species was intent on slaughtering each other and anything else at every opportunity. Back on our home planet, such behaviour was unimaginable." BG thought images of the Battle of the Nile, slave ships and slaughter houses to Two Legs.

"Our original mission was to prevent any advanced species from leaving its planet, but something went wrong and the Controller in charge paid the penalty. Now I have to clear up the mess. Humans may easily turn this planet into a dead world like the others in this solar system. But now they have just about escaped into space they may eventually be able to do similar damage to other life-supporting worlds if they ever discover the secrets of the speed of da...." BG stopped thinking abruptly. He was the Controller now and Two Legs was on a need-to-know, out-of-the-loop basis. He switched thoughts quickly.

"We are not going to try to save this planet from global warming or asteroid impacts or anything else which might wipe out most of the human race – plenty of other species will survive and evolve and if the entire human race becomes extinct so much the better. But we are not permitted to knowingly assist; that would count as taking life."
BG was on uncertain ground here but Two Legs appeared impressed but puzzled.

"My software informs me the Controller discovered that our home planet broke up following what may have been an asteroid impact. How can you be sure this planet will not suffer the same fate unless you show the humans how to construct an asteroid defence shield?"

"Unlike Earth, our planet was not protected by much larger outer planets which attract any really big planet-threatening asteroids. In any case this system's sun's gravitational pull is far too weak to cause Earth to break up. Any more thoughts?"

Two Legs had none, so BG explained how he intended to blackmail the President of the United States into fully committing the entire human race into preserving all other life forms, possibly at their own expense. If he could trick, mislead and blackmail geniuses like Newton and Halley, a politician should not be too difficult to deal with.
Two Legs made its first journey into space, located the correct communications satellites and successfully shut down most of North America's TV channels. A day later it switched them back on again and was given its next assignment.

Meanwhile BG successfully produced many more mechanical two-legged Starlings and instructed them to shut down all the mobile phone relay stations within 50 miles of the White House and then to undo the damage a day later. They too were then given other assignments.

BG, not willing to delegate his next move to a subordinate with two legs, paid a visit to the President. Not as easy as expected owing to the lack of open windows and his need for a face-to-beak confrontation. But being able to tune into the man's thoughts from a distance, BG eventually tracked him down as he was preparing for bed. Balanced on the edge of a table in the President's private living room he began thinking.

"Good evening, I'm the latest version of the Imperial Eagle Bird God who turned his back on Julius Caesar. I was also the rolling eyeball Ostrich mentioned in Ptolemy's Almagest. I have an urgent message for you."
The President, who had read his history books, knew the stories of a mysterious one-legged bird that had communicated by ESP but, like many before him was far from convinced. He also wanted to go to bed.
"Of course you are not convinced and want to retire, but some of my robot assistants have recently caused temporary havoc with some of your communications networks." BG thought the President the details and the man was no longer sleepy. Wide awake and tuned in, he thought a reply.
"But everything is up and running again. My experts tell me the breakdowns were caused by a solar magnetic storm."
"If you would switch your TV to the Chinese News channel, I will demonstrate."
The President did as thought.
"Now, just think that you would like this channel to be blacked out for exactly one minute."

The President again did as thought, although hoping for a longer shut-down. High above, Two Legs blocked the channel for exactly one minute. BG had been prepared to provide a similar demonstration with the President's mobile phone but he was saved the bother; the President was convinced.

"The Bird God of legend never made demands, only offered advice if I recall. So what are you up to?"
The President had clearly never read anything relating to BG's confrontations with Newton, Halley or Nelson.

"I'm simply demonstrating what might possibly happen if you are unwilling to accept my advice. The world's entire satellite communications and mobile phone systems could shut down and could remain shut down. Everything the modern human race relies on could stop working, including atomic power generators, weapons defence systems, hospitals, the internet, banks, stock markets, aircraft flights, the space station; everything."

"And your advice is?"
"Save the planet from man-made disasters. Kill each other if you must, but all other species must be fully protected. To do this you will have to set aside large tracts of land and sea where humans are totally banned. For a start this means no more deforestation, no more atmospheric pollution, the de-commissioning of all atomic fission units, removal of all space junk and very strict control of fishing."

The President was smiling. *"Great idea and if only we could. Let us assume that I personally agree that at least some of your suggestions, if implemented, would be good for the planet, how do you suggest I persuade anyone else?*

But BG was now a highly intelligent robot with the Boffin's brain – possibly the most intelligent being in the Galaxy – and he had done his homework. He also knew he could not afford to have his bluff called. He was not permitted to cause loss of life and shutting down atomic power stations might, indirectly kill thousands of people.

"We will divulge the secrets of a very cheap and entirely safe way to make unlimited power from nuclear fusion to your senior scientists and engineers. This information is to be provided to all nations free of charge by the United States, on the condition that they all combine wholeheartedly to save the planet according to our suggestions."

But the President could foresee snags; of course he could.
"No way can I persuade every nation to agree to anything, you must know that. Some will refuse our offer, some will back off completely once they have got the new power generators and most of the others will try to bend the rules whenever no one is observing closely."

"Yes, but once you have provided free nuclear fusion generators to every nation willing to accept them, they will discover they also need a way to store the power economically. You can hold those details back until every human on the planet realizes life will improve if their leaders agree to the global plan we have outlined. And before you think me that even so, the world's dictators, industrialists, and bankers will oppose any of this, we will let you into the first of several secrets.
The human race is slowly killing itself by radiation and pollution. These levels are building up and are about to trigger hundreds of millions of premature deaths and genetic birth abnormalities. We can provide you with scientific evidence of this and can also show you how to communicate by safe means. As you and I are doing now."

The President could see no obvious snags but doubted this strange creature could fulfill its promises; how could it? Then a thought suddenly occurred to the President. This robot bird certainly could disrupt the latest fully protected satellite communications systems, it could communicate by ESP and had somehow allowed him to do the same. No doubt it could also provide information which would allow the dangerous nuclear fission power plants to be replaced by safe nuclear fusion methods. His own scientists had assured him it was only a matter of **ti**me before they solved that problem themselves. So where had it brought this information from, how long had this robot been on this planet and were its masters planning an invasion?

BG decided that in order to persuade the only human on the planet capable of implementing his new mission, he really should answer the President's thoughts.

"We have been here since the time of Pythagoras and we came from a planet on the verge of destroying itself just as is about to happen to Earth. In fact it did destroy itself shortly before I met Christopher Columbus" BG was being somewhat economical with the truth as had been the previous Controller.

"And where was this planet? Surely not part of our solar system?"

"From a different system but I am not permitted to disclose any further details." The Boffin's brain then quite deliberately took charge and clearly thought how close Edmond Halley had come to guessing BG had come from the Rigel system back in his blushing days. The President had been paying careful attention and was now staring at BG's single leg.

But it was the continual use of "we" by BG that had the President really worried – exactly as intended. He shut his eyes for a moment and when he opened them again BG had disappeared.

Following a disturbed night during which the President dreamt he was conversing by ESP, he decided to confront his chief scientific advisor. When he had the man's full attention he carefully thought a question. His scientific advisor gave no indication that he had received a message, so, disappointed the President spoke it.

"How long would it take a probe using the most advanced technology imaginable to reach the star Rigel and return? Could the round trip be completed in less than a 1,000 years for example?"

His advisor had to refer to his lap top before replying. "Even at the speed of light it would take about 1,600 years and as we all know, nothing in the Universe can travel faster than that. So the answer is a resounding 'no way could it ever be achieved in only 1,000 years'."

The President, knowing only too well the year in which Columbus discovered the New World, needed no more convincing. The peculiar mechanical ESP-communicating Starling, if handled properly, could be persuaded to divulge wonderful scientific secrets. This would make mankind in general and his country in particular the most powerful in the Galaxy now that the robot's planet had destroyed itself. For the time being he would comply with the creature's every suggestion. In his excitement the President had already forgotten about BG's use of "we".

BG, who had inherited the Boffin's brain by default, now had the responsibility of scotching the President's double-crossing behaviour that he had been thought listening into; despite having shot over to Asia to replicate a new batch of two-legged mechanical Starlings. This was part of BG's plan to create massive flocks and set them all to use their ESP powers to infiltrate the entire planet's top predators brains with peaceful unambitious thoughts.

Time to personally start the ball rolling with the President and his scientific advisor.
"Well if that is what you and your scientific advisor are planning, I have a short message for you. No matter what else your minds are working on, the 39 letter message now imprinted within the innate behaviour sections of your brains will be triggered NOW and switched off again in 2 minutes time, but switched on again permanently whenever I choose to do so . The sooner you decode my message the better."

"SITNIALXPMXIPXSELTRDATOSSGGNDILRRAITSB"
The President began banging his head on the corner of the Oval Office desk hoping to rid his brain of this collection of letters.

The scientific advisor decided to leave but had trouble getting out of the door, not sure what to make of the door nob. Problem eventually solved, he came face to face with a security guard peering into the wrong end of his .40 caliber Glock pistol.

At which point BG's 2 minutes were up and the agent hastily holstered his weapon, the President desisted in his head banging and the scientific advisor wondered why he had contemplated jumping out of a window like a gibbering ape when he was scared of heights and then had identifying a door handle.

Loss of life was prevented and BG shot off to the UK to create more mechanical Starling recruits.

Meanwhile the scientific advisor wrote down the string of letters and, somewhat coincidentally having graduated from Dartmouth College, was familiar with the code-breaking achievements of Bancroft H Brown, recognised the Sir Christopher Wren method of encryption.
The message made chilling reading….
BIRDGOD STARLINGS START ESP IMPLANTS LXXXII

However the scientific advisor was at a loss to explain the LXXXII bit. Wren had dated his 1714 claim to Newton in Roman numerals but this collection represented 82.

Whilst the President and his advisor were thus engaged, BG was eves-dropping perched on the finial ball atop the White House flagpole. He hopped up and down a few times in sheer delight but was forced to perform his usual vanishing trick when roof-top guards took aim.

BG took no further action and so long as no research into the speed of dark was being contemplated, humans would be left to clear up their own mess; hopefully in peace.

EPILOGUE

Two years after the contents of the tiny spacecraft had been irretrievably scrambled, an American astronaut made a puzzling discovery. Driving the first lunar rover to explore the Moon's surface, he came across a peculiar feature that stood out clearly in the dust. A long line of bird single footprints stretched, straight as an arrow for nearly a mile, then stopped as abruptly as they had started. Odder was the fact that each one was separated from the next by at least two human paces. Being a keen ornithologist in his spare time, he noticed the distinctive footprint of a giant woodpecker.

Then he noticed what appeared to be a slightly scorched feather which he was careful not to touch. He wondered if the Russians were playing some kind of trick and it was booby-trapped. They had been the first nation to put a dog into orbit. Perhaps they had been using genetically modified giant birds as well? No, that was an impossible explanation. He decided not to report the discovery as he wished to be considered for the next space mission.

HAPPENSTANCE

Some years after BG's presidential encounter, NASA's inter-planetary Pioneer 11 space capsule, having completed its visit to Saturn, was, as planned, on its way to the near reaches of the Galaxy, through which it would maybe drift for millions of years. On the outside of the capsule was fixed a gold-plated plaque giving information of Earth's location, the human shape and a basic chemical formula. This was intended to convey to anyone out there who might come across it one day, the location of other intelligent life in the Galaxy.

The exit trajectory from our solar system set the capsule on a course towards a star in the Constellation Aquila, which it might have reached in a few thousand million years time had it been given the chance. But on September 30 1995 it sent its last radio transmission back to Earth. Unfortunately, it then crossed the path of a large lump of rock travelling at about one third the speed of light and came off second best.

This rock is now travelling, trajectory somewhat altered by the collision, in what may well turn out to be an elliptical orbit in the far outer regions of our solar system. But now, in addition to the remains of the Secretary General's eternal life machine and the piece of the lifting team's chief robot's fluorescent orange upper covering, it also has embedded in it, clearly visible, a gold-plated plaque. Meanwhile the descendants of the original rock-eating microbes are, in all probability, still deep inside and still munching happily.

Halley's comet is currently heading away from Earth carrying 2 man-made objects on its surface. Halley would have been delighted.

All the humans in this story were real people and their ideas, discoveries and adventures are true, with the possible exception of their encounters with the Boffin Bird. Doubtless some of the discussions/thoughts were not in English. The code mentioned on page 118, for example, is translated from the original Latin.

Factual events and codes mentioned after the year 1650 are detailed in the author's first and third Navigator Trilogy books *"Astronomical Minds- The True Longitude Story"* and *"The Cuckoo Paradox".*

MAIN CHARACTERS

Pythagoras of Samos (born 572 - died 492BC).
Thales of Miletus (circa 624 -547BC).
Aristotle of Stagira (384 - 322BC).
Heraclides of Pontos (c. 388 - 322BC).
Aristarchus of Samos (c. 310 - 230BC).
Archimedes of Syracuse (287 - 212BC).
Eratosthenes of Cyrene (276 - 194BC).
Apollonius of Perga (c. 262 - 190BC)
Hipparchus of Rhodes (c. 190 - 120BC).
Emperor Julius Caesar of Rome (100 - 44BC).
Claudius Ptolemy (c. 85 - 165AD).
Christopher Columbus (1451 - 1506).
Abraham Zacuto (c. 1452 - 1515).
Nicolaus Copernicus (1473 - 1543).
Tycho Brahe (1546 - 1601).
Nicholas Reimers (1551 - 1600).
Emperor Rudolph II of Austria (1552 - 1612).
Johannes Kepler (1571 - 1630).
Hans Lippershey (1570 - 1619).
Galileo Galilei (1564 - 1642).
Robert Hooke (1635 - 1703).
Christiaan Huygens (1629 - 1695).
Jean Cassini (1625 - 1712).
Christopher Wren (1632 - 1723).
John Flamsteed (1646 - 1719).
King Charles II of Great Britain (1630 - 1685).
Isaac Newton (1643 - 1727).
Edmond Halley (1656 - 1742).
Clowdesley Shovell (1650 - 1707).
Queen Anne of Great Britain (1665 - 1714).
John Harrison (1693 - 1776).
George Graham (c 1674 - 1751).
James Hadley (1682 - 1744).
Thomas Godfrey (1704 - 1749).
James Bradley (1693 - 1762).
Nevil Mascelyne (1732 - 1811).
King George III of Great Britain (1738 - 1820).
James Cook (1728 - 1779).
Larcum Kendal (1719 - 1790).
Johann Forster (1729 - 1798).
Horatio Nelson (1758 - 1805).
George Murray (1759 - 1819).