

SCORPIO

Journal of the Astronomical Society of Frankston Inc

25 YEARS

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P.O.Box 596, Frankston Victoria 3199

Dec 1994

FUTURE EVENT**GENERAL MEETING**18th January 1995

Topic - Unknown at this stage

15th February 1995Topic - General Forum Discussion
Come armed with questions**VIEWING NIGHTS & EVENTS**Public viewing nights every Friday
night at The Briars during January.

Don't forget

"IF IT'S RAINING:IT'S OFF"Cranbourne Picnic Lunch at
Cranbourne Botanic Gardens
21-Jan 95 starting at 12 noon.

BYO everything.

COMMITTEE MEETINGThe committee will be held at the
Brown's residence on:-26th Jan 199523th Feb 1995

The Astronomical Society of Frankston was founded in 1969 with the aim of fostering the study of astronomy by amateurs and promoting the hobby of amateur astronomy to the general public. The society holds a General Meeting each month for the exchange of ideas and information. Regular observing nights, both private and public are arranged to observe currently available celestial objects. In addition the Society provides the services of its members for educational presentations or observing nights for schools and local community groups.

VASTROC '95

The preliminary notice for the 1995 Victorian Astronomical Convention has been issued. The convention will be held at the University of Ballarat over the weekend March 25.

This year the Ballarat Astronomical Society will be hosting the event.

The Theme is:-

"Amateur Astronomy in a Technological World"

Papers or posters are being sought.

Details can be obtained from a committee member or direct from the BAS via:

Peter Caldwell

Box 136

Belmont, Geelong

Vic. 3216

Three levels of accomodation are available to meet all budgets.

Costs \$32 adults \$10 under 18 years

Dinner \$18 per head

Proceedings \$10 + \$2 P&P

You need to advise interest only at this stage.

FOR SALE AT MEETINGS

Society Badges \$5

Planospheres \$8

Telescope Making Equipment

Mirror Blanks, Grinding & Polishing
Compounds, Spherometers, Eye-
pieces, Secondary Mirrors, Spiders**Meeting Venue:**

The Peninsula School

Wooralla Drive, Mt Eliza

(Melways Map 105, F5)

Room F6 at 8.00pm on the third
Wednesday of each Month

Visitors are always welcome

Annual Membership Fees

Full Members \$20

Concession Members \$15

Family Members \$30

Family Pensioners \$25

Membership Fees due 1st January
each year**President**

Peter Lowe 018 318 920

Vice President

Peter Skilton (03) 776 5898

Treasurer

Peter Brown (03) 789 5679

Secretary

Don Leggett (059) 85 4927

Committee

Ros Skilton (03) 776 5898

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Steve Malone (03) 789 6239

Don't forget if you have any
comments or contributions - please
contact the Editor

PRESIDENTS REPORT 1994

This year has been a very successful year. We have tried a number of new innovations to improve the members participation in the society activities.

The January general meeting, the Mid-winter lectures, Briars Viewing nights, Split lectures formats at general meetings and of course more social events.

Astronomically 1994 has been an interesting year highlighted by the impact of comet Shoemaker-Levy with the planet Jupiter. The exploration of the planets was given a big boost after successful repairs to the Hubble space telescope plus exploring space probes have shown us Venus and unprecedented views of the asteroids, including an asteroid satellite. Finally we have seen the double planet Pluto and Charon clearly resolved.

On the wider scale, astronomers seem to have found their first confirmed black hole. A 3 million solar-mass monster at the centre of the galaxy M87. A prime suspect for a black hole, M87 is one of the most studied galaxies around and the first studied by the rejuvenated Hubble telescope.

Observers at Mt. Stromlo have been steadily finding evidence for small, cool bodies spread through our galaxy. The bodies have been detected by their gravitational lensing of background starlight. While more evidence is still needed, it seems the long sought missing mass galaxy may have been found.

And finally as always seems to be the case each year, the universe has gotten bigger and smaller depending upon the value of Hubble constant. Observations with the Hubble scope have revealed variable stars in distant galaxy clusters suggesting a smaller universe than previously accepted. On the other hand the search for distant galaxies has pushed the red shift record to higher levels supporting an older universe. Only time will tell!!

Certainly the universe in 1994 is very different to the one in 1993.

On a more Earthly note, our Society has been going through its own evolution. The committee last year had set some plans in place to enhance the society activities and members participation.

In essence our plan was:-

1) Increase Membership - our membership has been slowly rising and we did not see the usual membership slump through winter.

2) Increase membership activities both astronomical and social. The social events run this year have all been well attended and the positive feedback highly encouraging. Some of our planned observing nights have fizzled and this is an area that needs work. The construction of an observatory at The Briars will no doubt help.

3) Make the General Meeting more informative and entertaining. This has been a difficult task. The split general meeting has provided members the opportunity to choose between lectures or discussion groups: but I feel we have not yet found the right solution here. The success of the winter lectures means they will become a regular part of our years activities.

To the future, my vision for 1995 is regular observing at our Briars observatory. We need the members help and commitment to bring this vision to reality and it is within our abilities to achieve this next year.

I wish to thank the committee for their efforts during 1994 and everyone who helped to make 1994 a memorable 25th anniversary.

Merry Christmas and Happy New Year to All

Peter Lowe

President, 1994

* STOP PRESS *

We have finally received the lease agreement from the Mornington Council to allow us to use the land at the Briars for an observatory.

This will be signed in the new year after which we can start planning our observatory design. (Remember ideas always welcome)

Members can observe from this site at any time provide the caretaker has been notified. Notification should be arranged through David Girling

1995 will be The Year of the Briars Observatory so if you can help out please talk to a committee member.

P.J.Lowe.

* VIEWS & IDEAS *

At the November general meeting a questionnaire was handed out to get the members views on what you want from the Society and how we can make those activities more enjoyable & rewarding.

We haven't had too many replies but some of the comments have been interesting and we will take them onboard at the committee planning meetings.

We could do with more ideas. Just remember if you don't tell us what YOU want then we will plan on what WE want. Regular feedback {Good or Bad} from members is essential if the Society is to flourish. We can always talk it over a coffee at the general meetings. So come and talk to me or a committee member about your needs.

P.J.Lowe

WHAT'S NEWS IN ASTRONOMY - BY PETER SKILTON

A Hardened Endeavour

As you may know, the space shuttle Endeavour is currently in orbit, and has been conducting experiments that would be of use for future manned bases, whether in orbit around the Earth or on the Moon.

Coverage of one of the astronauts manoeuvring in space without a tethering rope was recently shown on television. Here, the standard length of rope to prevent an astronaut launching himself into the void never to be seen again was not used. Instead, a small propulsion back jet pack was employed to move one of the crew away from the shuttle. In the process he therefore became the first human satellite since he was not physically connected to the mother ship. Fortunately, all systems functioned perfectly and he was able to later get back to the shuttle proving the viability of the technology. Although not indicated in the press releases, a fellow astronaut was probably suited up and standing by to throw a line to his colleague just in case problems were encountered.

Over the years, many science fiction movies have shown hapless astronauts being thrown struggling into space when their tethering rope is supposed severed. This scenario may now be a thing of the past. Of course if the jet pack fails, the astronaut is in a bit of trouble as he cannot haul himself back via a rope. Maybe he could throw something into space in the opposite direction so that the impulse will propel him back to the ship. A faulty jet pack would make a wonderful choice of projectile, as well as no doubt relieving some anxiety at the time.

The Endeavour mission has been setting other weighty records to do with construction in space. It carried quantities of concrete and sand into orbit, as well as a cement mixer. The cement mixer was of course a small battery powered one, not a large multiwheeled vehicle! The firm plan is to test the behaviour of concrete structures in a weightless

environment, with a view to one day building multi-storey structures on the Moon. I recall reading somewhere that tests on samples of Moon rock show it to be suitable for use in making cement, thereby alleviating the very costly need to transport large volumes from Earth.

A Bump in the Night

In early September, 32 year old Russian cosmonaut Yuri Malenchenko guided an errant transport craft to dock with the manned Mir space station.

The transport craft, stocked to the brim with nearly 3 tonnes of food, water and scientific equipment had twice attempted docking and failed both times under automatic pilot. With just sufficient fuel for one last try, Malenchenko switched to manual control and gave it one last shot. Despite being his first time in space, he succeeded. With water and food running dangerously low onboard Mir, if the docking had failed, the three cosmonauts on board would almost certainly have had to abandon ship, possibly jeopardising its later reuse since orbital corrections are needed from time to time. (Remember the US Skylab space station fell over Western Australia shortly after being abandoned).

The entire docking was carried out by remote television, beamed from the craft to Earth, then up to Mir again. The transport craft flew to within 140 metres of Mir under autopilot, then manual control was used for the final manoeuvre. Apparently, the craft gave Mir a gentle bump in the process, but this was clearly what was needed. The resupplying procedure has operated flawlessly for 8 years to date, and this is the first failure reported.

Real Rock and Roll

Rock musician Frank Zappa has been immortalised in space. Asteroids are sizeable chunks of interplanetary rock that orbit the Sun and tumble around on their axis like a spinning top.

In August, the International Astronomical Union which is charged with naming all solar system discoveries, decided that asteroid number 3834 will henceforth be known as Zappafrank.

The decision was made after his death last year, when supporters of his music sent a barrage of about two hundred lobbying letters to Brian Marsden of the IAU. Zappa's name was rearranged as shown above so as not to confuse it with an existing asteroid already called Frank.

Frank Zappa was a symbol of freedom in Czechoslovakia, and so asteroid 3834 was fittingly chosen because it was discovered at the country's Klet observatory in 1980.

Asteroids have been named after many strange things in the past. Other musicians have similarly been immortalised in celestial stone. There are asteroids called, Lennon, McCartney, Starr and Harrison in honour of the Beatles, and there are also Oldfield (for Mike Oldfield), Clapton (for Eric Clapton) and Jarre (for Jean-Michel Jarre). Another proposed name was to honour the group Queen, and was suggested to be Wewilroku (after one of their songs), but the IAU narrowly rejected it.

Cold Comet Still Releasing Gas

As many will know, when comets approach the inner regions of the Solar System, volatile gases, and mostly water, trapped on the comet are heated by the Sun and are boiled into space, producing the bluish tail that is characteristic of a comet. A few strange comets do not seem to shut this outgassing mechanism off when they leave the region close to the Sun, and occasionally have outbursts even when far from its warming influence.

Comet Schwassmann-Wachmann-1 is one such peculiar comet.

This unusual comet orbits the Sun every 15 years, and departs out to about 6 times the Earth-to-Sun distance each orbit. It is roughly 20 kilometres across, and so is a sizeable lump of rock and ices.

Close up views of the coma of the comet (the fuzzy bit close to the solid centre) show it is not perfectly spherical, but instead somewhat asymmetric. This indicates that local pockets of gas are causing individual jets to be propelled into space.

When far from the Sun, outside of the orbit of the planet Mars, the temperature is far too low for water to be lost from a comet and form these jets. Instead, it should be very firmly locked up as supercold ice. The question then arises as to just what is being released from the comet when far from the Sun, if water is ruled out.

Recent studies by the giant telescopes at Hawaii's Mauna Kea observatory have detected large amounts of carbon monoxide being given off by Schwassmann-Wachmann-1. This gas was found to be moving at 400 metres per second relative to the comet in a direction opposite that of the Sun. This is highly suggestive of it being a tail being ejected from the main body of the comet.

It is thought that solid carbon monoxide is subliming from the comet, probably also forcing other material out into space as a result of the jet force produced.

Sublimation is the process of going from a solid to a gas, without passing through an intermediate liquid state. This can sometimes be observed if wet washing is hung out to dry on a very cold morning. The ice literally comes off in puffs of steam without forming liquid water.

The temperature at which carbon monoxide can sublime is much lower than that for water, and so provides a good explanation of outgassing far from the Sun. The temperature at the comet's current position is 247 degrees Celsius below zero! Very nippy indeed.

It is interesting to ponder that the comet is losing 1500 kilograms of material every second, and this is when it is far from the Sun in the icy depths of our Solar System. Even so, it is calculated that the emission of material can occur for about 60 more orbits before the comet is extinguished and then disappears from view.

To Whom It May Concern

A satellite with an unusual purpose was launched from Cape Canaveral in early August. It carried messages from nearly 40,000 people. To whom you might ask. Well, the 4 kilogram lightweight SpaceArk satellite is intended as a high tech time capsule, to be intercepted and read by some distant generation. The small craft hitched a ride on board a rocket that also placed a communications satellite into orbit as its primary mission.

Inside SpaceArk were jammed computer tapes containing the greetings and messages, as well as a compact disk containing music and two CD ROM's of information. The intention is that the spacecraft will remain in orbit about the Earth indefinitely. The piggy back mission was organised by the Rochester Museum and Science Centre in New York. It seems somewhat unfortunate that no compact disk reader or CD ROM reader was also included. Hopefully, future generations will understand how to read the information if and when they retrieve it.

Strange but True?

Recently a short letter written by the Science Fiction writer Arthur C. Clarke pointed out some strange coincidences to do with the arrival of comet Shoemaker-Levy-9 at Jupiter in the last few months. It turns out that the impacts of the largest fragments of the comet coincided with the 25th anniversary of the Apollo Moon landing mission. In fact, the impact of the largest fragment coincided to the minute with the actual Moon landing itself, both occurring at 4:18 pm US time. Furthermore the first fragment hit Jupiter on the 16th July, which was the launch date of Apollo 11, and the final fragment hit on 22nd July, which marked the departure of the mission from the Moon. In other words, the start, climax and end of the impact series matched exactly with the start, climax and end of the Apollo mission. I wonder what coincides with the 25th anniversary of the ASF this year. If only we knew the exact date of this historic moment.

Abandon All Hope Ye Who Enter

Over the last couple of years, NASA has been experimenting with technologies for exploring other planets by remote control. One such experiment has involved the robot dubbed Dante, named after the ancient literary character who descended to Hell and returned safely to Earth. On Earth, the robot was sent into a volcano in order to measure gases near the magma, where it would be far too dangerous to send a human on a rope.

Last year, this eight legged robot (which looks like a beetle the size of a large van) was instructed to climb down into an active volcano at Mt. Erebus in the Antarctic. At the time, the robot only moved a few metres into the smoking vent before its optical fibre communications cable became snagged in rocks, and required winching out of the fiery pit. The documentary about this mission was recently broadcast on the television.

This month, a version 2 of the robot was tried in an Alaskan volcano, with all the previous bugs having been sorted out.

It began its trek into the mouth of Mt. Spurr and successfully sampled gases on the way down. However, on its way back up again, it lost its footing on some loose material on the walls of the volcano, and plunged into the fuming mouth. It landed on its side like a giant beetle unable to upright itself despite thrashing its legs around.

After a week of intensive efforts using a helicopter and winch, the robot was retrieved but not without further drama. The first attempt tried pulling it up by its optical fibre communication link, but this snapped under the strain and send the beastie tumbling further into the volcano. Finally, men were sent abseiling into the crater (despite the danger) to manually connect a winch cable to the robot's body, and it was ignominiously hauled back out to daylight. Back to the drawing board.

Dante was supposed to demonstrate the technology needed for exploring say Mars by remote control, however, if its performance to date is anything to go by, the mission would be rather brief and frustrating as no rescue mission would be possible under such remote conditions. With luck, version

Check Your Pulse?

Astronomers in Australia have confirmed the existence of a rare stellar phenomenon in our Milky Way's companion galaxy, the Small Magellanic Cloud. The newly discovered system involves a radio pulsar (or neutron star) locked in orbit about an apparently normal optically visible star.

This strange duo should enable astronomers to determine if the methods they use to estimate the mass of distant stars, is right or wrong.

After years of studying the radio pulsar, scientists using the Australia Telescope facilities detected a pattern of changes in the radio emission from the system. The periodic nature of the pattern indicated that the pulsar was part of a binary system, where the **second component is a giant companion.**

To date, only one other such binary system of this type is known in our own galaxy, the Milky Way.

A pulsar is the unbelievably dense remains of a star, left over after a titanic supernova explosion at the end of a star's life. The impulse from this explosion causes the bare core of the original star to spin on its axis at very high speeds, emitting rotating beams of radio energy in the process. These beams sweep across the sky like a lighthouse beacon, and can be detected on Earth. The star that gave birth to the pulsar was approximately 1.4 times the mass of our Sun, but squashed into an object the size of a city.

The Milky Way has under 700 known pulsars, but contains over 100,000 million stars. They are therefore quite rare in their own right. The Small

Magellanic Cloud contains only one known pulsar.

Using telescopes sensitive to normal visible light, the suspected optical companion star of the pulsar was eventually pinpointed. However, its spectrum indicated that it was 10 times the mass of our Sun. Calculations from the radio spectrum of the pulsar suggested it should be many times smaller than this. Further careful measurements will be needed to determine which of the two methods (optical or radio) is giving the correct answer, and maybe one method may need to be reconsidered.

Over the coming few million years, the two stars will slowly draw closer together, until the pulsar begins sucking matter off the bright companion, particularly when this latter star enters its red giant phase and begins swelling in size. Once this happens, either the pulsar will spiral into the larger star, destroying it, or else will slowly drain it into oblivion.

The Day the Sky Fell in Uganda

On 14th August 1992 at 3:40 pm local time, a terrifying afternoon shower of substantial meteorites rained down on the Ugandan town of Mbale. It was preceded by a witnessed large explosion in the sky, which gave birth to these fiery invaders.

For many minutes after the initial bang, rubble streaked across the sky, creating a low rumbling noise in its wake, and leaving a smoky trail accompanied by a cloud of dust across the sky. It was also accompanied by several sonic booms that sounded like machine gun fire.

The sound was so intense, that some villagers thought local rebels from a nearby village were bombing their town, since this village lay in the general direction from which the rumblings appeared. Minutes later, Mbale was peppered by high speed stones that reached the Earth's surface.

Many fragments were recovered, typically about 1 to 10 kilograms in size. Considerable damage was caused to the township, though fortunately most of the falling stones landed away from main buildings. The worst hit areas seemed to be around the town's industrial area and in a local prison, where many impact craters were discovered. To date, 50 sizeable holes in the ground have been noted.

One 11 kilogram fragment created an 85 centimetre deep crater in the ground where it impacted. Fortunately no-one was standing under it at the time. Another splashed mud over a building which it narrowly missed by about a metre.

Damage was also registered at the railway station, with one lump smashing through the station's roof and pulverising the concrete floor beneath. A rock weighing in at a couple of kilos, fell on a Shell Oil petroleum storage facility, where it landed smack above an underground fuel tank. Fortunately, it only bored down a few tens of centimetres, so a disaster was averted.

A 5 kilo stone pierced the local cotton factory, denting a machine before fragmenting. Strikes were also noted at a coffee factory and sewerage works.

No one was seriously injured in this major fall.

A 4 gram stone travelling at high speed did hit a boy from the neighbouring township of Doko. This fragment is about as heavy as an eye dropper full of water. In fact the stone hit him in the head like a small rifle bullet.

He is now renowned world-wide as the first documented and substantiated case of a person known to have survived being hit on the head by an extraterrestrial.

He was very lucky in fact.

The parent body for the fragment would have hit our atmosphere at the astonishing speed of around 20 kilometres per second. Travelling from Frankston to Melbourne would have taken a mere 2 seconds at this rate. At this speed, the air could not get out of the way of the projectile fast enough, causing the body to heat up very rapidly and shedding its outer layers by the process called ablation. The friction from this plummeting through our atmosphere would have had an enormous braking effect on the parent's descent. Eventually the aerodynamic forces caused what remained of the parent to break up into the smaller fragments that reached the ground, the rest disintegrated.

The descent of the 4 gram projectile that hit the young boy had most of the force taken away as it struck the leaves of a nearby banana plant before ricocheting and hitting him. As one of the initial researchers was heard to have said, had it been one of the larger chunks, "the boy might not have remained in a position to recover the stone".

The largest fragment was a hefty 27 kilograms, and was found in a 1.5 metre pit it had excavated for itself. The smallest was a mere 0.1 gram, but

not to be sneezed at when its high velocity is taken into account.

Over 150 kilos of fragments, numbering nearly a thousand in total have been recovered to date, though the swampy nature of the surrounding districts probably means that more are present but are much harder to find since any fragments may have burrowed into the earth quite deeply and covered with water or mud. Once the swamps dry out, further searches will be conducted.

A similar problem exists with our local Cranbourne meteorite that landed several thousand years ago in the then swampy region around what is now Cranbourne. Although a dozen pieces have been recovered, more are likely buried underground and are yet to be discovered.

Even if the path of the Mbale meteorites had not been witnessed, its general direction could have been obtained since the fragments were spread over an area the shape of an ellipse. The smaller particles would have been braked first by the atmosphere and so would have dropped to the ground first, appearing at one end of the oval shape. The larger remnants could survive their passage for longer and so travelled further, thereby dropping at the opposite end of the oval. Therefore the long axis of the ellipse pointed conveniently towards the direction of entry into our atmosphere.

All the recovered meteorites had a black crust on them, caused by melting due to aerodynamic friction during their fall through our protective atmosphere. They are thought to be chondrites composed of stone and containing small flecks of iron and magnesium silicates.

As yet, an exact orbital determination of the parent body is to be done, however, a preliminary calculation based on eyewitness accounts of its path and direction in the sky at certain times, showed that the parent body originated in the main Asteroid belt between Mars and Jupiter. The

HISTORY OF THE MOON

With the recent anniversary of Apollo 11 landing on the Moon, it is timely to look at one of the most fundamental of the Apollo discoveries: namely that the Moon was not made in a cheese factory.

In the 1960's, there were a small number of favoured theories as to the origin of our Moon.

The son of the famed biologist Charles Darwin (George Darwin) proposed that the Moon was formed from the early Earth spinning very quickly as it initially formed, causing a molten blob to be flung into space. This blob of rock then apparently formed the Moon as it cooled.

Another idea was that the Moon was a passing large asteroid, that was captured by the Earth's gravity once it passed too closely. Yet another strong contender was that the Earth and Moon formed together out of condensing debris left over from the cooling of the Solar Nebula cloud that gave rise to our Solar System.

In 1946, the giant impactor idea was thrown into the arena by Reginald Daly, a geologist at Harvard University, then promptly ignored until about 1983 when scientists began to study it more closely.

The rocks returned by Neil Armstrong and Buzz Aldrin in 1969 were from the surface of the Moon. They were of two kinds: dark, titanium rich basalt rocks from lava flows, and lighter coloured rocks from the lunar regolith.

The regolith is the Moon's equivalent of soil. It has formed over the millenia by asteroids and meteoroids colliding with the Moon and producing craters. The debris from these is scattered around. As time goes by, later impacts repulverize this material, forming craters in craters in craters, and so on. Eventually, only a fine dust is left behind. Indeed, the mare (or seas) on the Moon are formed from large ancient impacts, and are readily seen with the naked eye. Seismic studies by the astronauts showed that the Moon had no core.

Analyses of the Moon rocks showed the Moon contained considerable quantities of plagioclase feldspar. This material is extremely light and bouyant, found floating on top of molten magma on the Earth's surface. The idea was that this slowly precipitated as the Moon cooled from its totally molten state. The feldspar being very light would then float to the surface, to be collected many billions of years later by the astronauts.

After the Apollo landings, the Darwin theory was favoured since it at least explained why the Moon was totally rocky, being formed from the molten lighter materials of the Earth's surface being spun off into space. The heavier materials of the Earth had already descended to the core under gravity. However, to achieve a Moon by a spin off of material would require our planet to rotate every 2 to 3 hours (a very short day indeed), a speed which cannot be explained by any theory of planetary formation.

From extensive studies of the Moon rocks returned to Earth, it is now clear that our orbiting neighbour was born in the most violent of circumstances. When we gaze upon our natural satellite, we are really looking at the remnants of a collision between a foreign body the size of the planet Mars, and the primordial planet Earth.

About 4,500 million years ago, a phenomenal collision occurred.

In the process, the core of the Mars-size body was ripped out and captured by the Earth, adding to the Earth's own metallic core. This core is composed of Nickel and Iron. The rocky mantle around the core was disintegrated and spread around the Earth like a giant ring of debris, not unlike a small version of the planet Saturn. Of course, a goodly amount of the Earth's mantle and crust would have also been ejected into orbit at the same time, and most of the surface and mantle of our planet would have become molten from the energy released in the impact.

Over time, this debris ring slowly cooled and coalesced into a single body: what is now our Moon. However, it would only comprise rocky materials, since any heavy metallic elements would have been captured by the gravity of the Earth's core. This explains why the Moon has no metallic core at all. If both Earth and Moon formed together in the earliest days of our Solar System's birth, then the composition of both would logically be very similar, if not identical.

Fortunately, the giant hammer blow was only glancing, otherwise it might have broken up the entire Earth there and then. Instead, it caused the Earth to rotate much faster. This rate of rotation has slowed slightly over the aeons, until today it takes 24 hours for the Earth to rotate once. At the same time, it is thought that the impact caused the Earth's axis to tilt over by about 20 degrees. The fact that our axis is tilted from the vertical is the reason we have seasons throughout the year. In fact, the planet Uranus has its axis virtually tipped over at right angles, probably from the result of a much larger collision in its history.

It was not long after the Moon formed that life emerged on the Earth. Fossil evidence gives the date of this momentous event at about 4,000 million years ago. While life was forming, the Earth was then bombarded many times by giant impactors which would have caused many mass extinctions. Evidence for these extinctions is also found in the fossil record. 240 million years ago, at what is known as the Permian-Triassic boundary, over 95 percent of all species on the Earth suddenly vanished, and the Age of the Dinosaurs began. Then 65 million years ago, the dinosaurs also hastily departed from the fossil record. Once the period of bombardment subsided, life eventually got a strong foothold, and here we are today.

Peter Skilton

mainly stony composition comes therefore as no surprise. Analyses of short-lived radioactive isotopes in the meteorite fragments, showed that the size of the original body was about 1,000 kilograms.

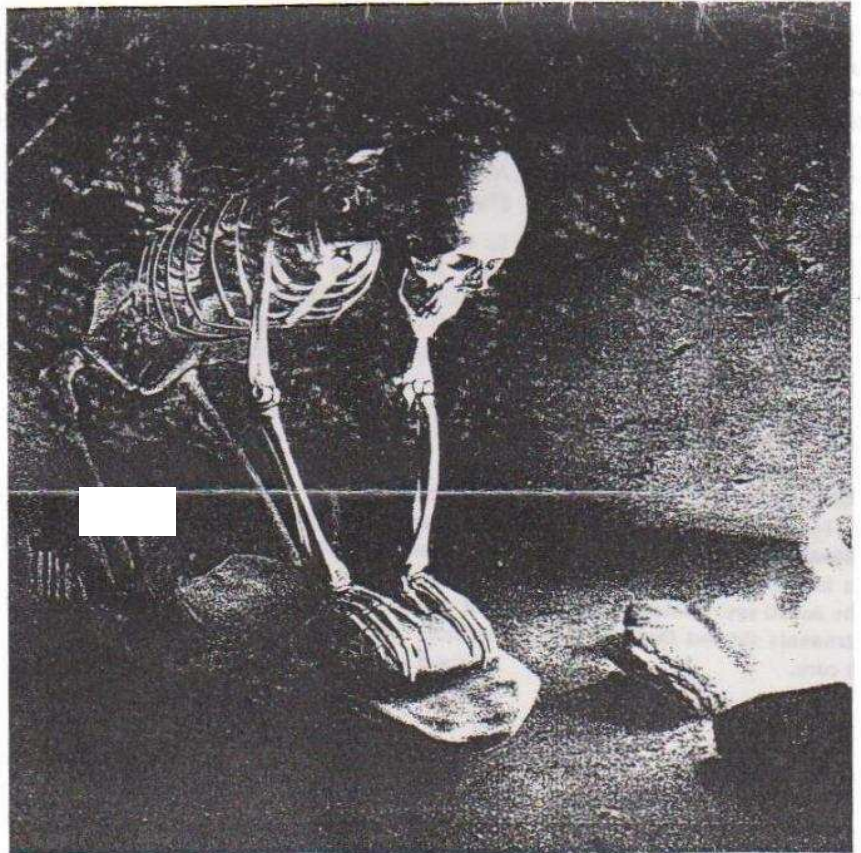
It is more than likely that this body was dislodged from its orbit in the Asteroid belt, either as a result of a collision with another similar body in a similar orbit, or else by interaction with one of the planets, notably the gas giant Jupiter. Either way, it would have received a sufficient impulse to divert its orbit into the inner Solar System. After potentially many thousands or even millions of orbits, the Earth eventually intercepted its newly perturbed orbit, and the parent body entered our atmosphere landing in the small African country of Uganda.

Peter Skilton

Below - Xmas BBQ at Mt Martha Park
On 10th December 1994

Photo - By John Cleverdon

Another year passes as the 15 and 16 inch mirrors take shape



The daily grind

