SEPTEMBER 2003

AGWA
ASTRONOMICAL GROUP OF WESTERN AUSTRALIA
OBSERVER

Diary of Events

September

AGWA meeting—Tuesday 2nd—7 pm 9:30 pm

Dr Alex Bevan from the WA Museum is the main speaker.
He will talk on the subject of meteors and meteorites.

The post-break speakers will be Ian Bacon and Grant Thornett who will discuss deep sky observing.

- **MARS** viewing – 29th August at **BTOW** from ……until dawn. Sausage sizzle, Mars movies (and Mars bars???).
- Astrocamp - 26th to 29th September - North of Two Rocks near Guilderton (see article below)
- Deep sky observing - There will be no deep sky observing at Golden Grove for around 2 months. This is due to Mars viewing commitments. We must say a big thank you to Jeff and Grant for noticing that there was an electrical problem up at the observatory. If you are going to the observatory please check with Graeme Clement before you go on 9443 1201 or mobile 041 4506 054.

AUGUST NOTES

AGWA NIGHT—BICKLEY OBSERVATORY

On the evening of the 5th August, 60 members and their guests made their way up the hill to the Bickley Observatory for a smorgasbord of astronomical delights! After chasing an illusive iridium satellite, which was notable by its absence as it had been forecast a day early by one of the observatory staff (they are human!) – everyone assembled in the main lecture theatre for the official start to the evening's entertainment. Ron Hille hosted the evening superbly. After introducing himself and making new members welcome, he introduced the main speaker and host, the indomitable Peter Burch.

Peter's presentation was in two halves. The first described the recent history and operation of the Perth Observatory. It was noticeable how much of the Observatory's funding now relies on monies received from public viewings. The second half of the presentation focused on the feature of the month – Mars' opposition! Peter explained with great illustrations why Mars is the closest it has been to Earth in 60,000 years and encouraged everyone to have look!

With this the group was divided into two. One set proceeded to the main 24" telescope which is mounted above tree level to provide good viewing. On this night, the instrument was automatically computer operated, conducting a program searching for planets outside the Solar System. This is part of a world-wide program of which telescopes in South America, South Africa, Perth and Tasmania are used. The spread of the telescopes ensures that at least one telescope can view at any time.

The second set was split into three and visited the smaller domes that housed the public viewing telescopes. These consisted of a 14" Celestron SCT, a 16" Meade SCT and a beautifully restored 12.5" Newtonian that was housed in an observatory that had a roll off roof. Through these telescopes we observed a number of objects including Omega Centauri, the Moon and Mars.

Ron Hille for once arranged some good weather, so we were able to see all the objects without clouds! (Just remember how you did it Ron!)

We then returned to the Main Lecture Room for coffee, biscuits and a bit of socializing before Ron wound the evening up and we made our way back down the hill! This was a wonderful evening and it was suggested that we make it at least an annual event. We wish to thank Peter Birch, his fellow workers and volunteers for their great efforts on the night. Well worth it.

AGWA ASTROCAMP 2 - LAST WEEKEND IN SEPTEMBER

Our first astrocamp was a success with lots of fun. The next will be even better. Everything has been organised and is ready to roll.

Venue

Brookside Accommodation (08) 9575-7585. It is on Gingin Brook Rd, three kilometres from the intersection of Wanneroo Rd (north of Two Rocks, near Guilderton). There are signs. You cannot miss it.

There are nine rooms, each with two beds. Two rooms contain a double bed plus a single, suitable for a family situation (first come first served). The rooms are insulated so sound should not be a big problem for those intending to sleep after a hard night's observing. The rooms contain their own bedding. I suggest bringing a black sheet to put over the room's window to block sunlight (unhealthy stuff) while sleeping.

Time & Date

The Monday (30th) following the last weekend in September is a public holiday. Our accommodation is booked for a stay from the evening of Friday the 26th of September, the day and evening of Saturday 27th September, the day and evening of Sunday 28th September with a departure on Monday 29th of September. People can stay for the three nights or merely one. I will be onsite from mid-afternoon on Friday to Monday am.

Cost

$25 per person, per night for a room. $15 per person, per night for a tent or caravan on site.

Facilities

The building we will be staying in is only two years old, so everything is brand-spanking new. There is a kitchen with a large gas stove, a microwave, large fridge and freezer, cutlery and bits and pieces. There are separate male and female facilities. In addition there is a ping-pong table, a gas bbq, tables

Within a few kilometres there are several restaurants and coffee shops. Gingin itself is 30ks east. No one will starve. There is also a host of touristy things available during the day for those unfortunates who don't want to stargaze.

Bring along

Your own food, towels, telescope, and so forth. There is power available for scopes at the observing sites so bring along an extension cord. We have an observing site where telescopes can be left during the day, I suggest covering them with a sheet as protection against the elements.

Ian Bacon 9247-1003 ibacon@graduate.uwa.edu.au

Timetable

Friday (26th)
evening - arrival, evening meal,
sunset observing

Saturday (27th)
13.00 astrotalks & solar observing
18.00 onwards BBQ
20.00 observing

Sunday (28th)
12.00 trip to Yallalie crater (4 hours)
13.00 astrotalks & solar observing
19.00 trip to SCCC

Monday morning (29th)
departure

AGWA ASTROCAMP GUIDELINES

We are all sensible people, however, it is always best to clearly outline some do's and don'ts so that people don't do don'ts and do do do's.

a. Neatness and tidiness
We are responsible for leaving the accommodation as clean as how we found it. Please clean and tidy before you leave. No pets in food preparation areas.

b. Lights
The primary purpose of the astrocamp is to do some dark sky stargazing. Thus, minimise use of white lights at night, (stick to red light).

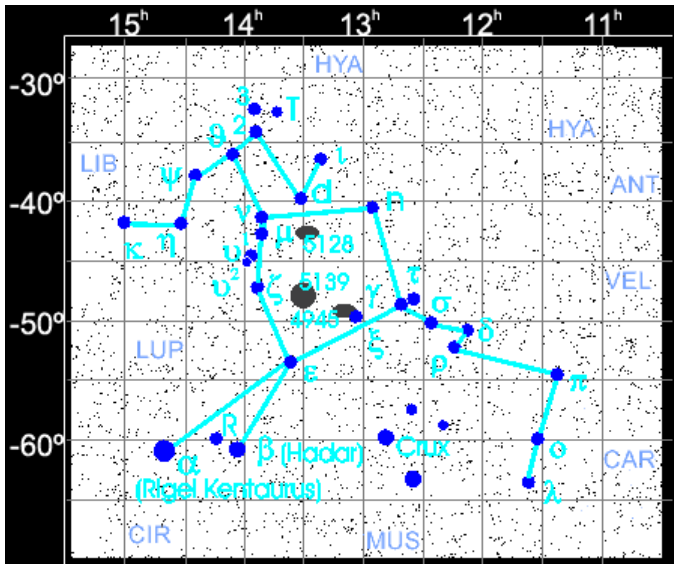
c. Sleep
There will be some people who will stargaze all night and sleep all day. Try and keep the noise to a responsible roar during the day while these people are zzzzzing.

d. Payment
Please pay the balance of your fee before you leave. This will allow me to settle with the owners on the spot. Please try and have correct change.

e. Children
If you do bring kiddies along please ensure that they behave. And remember to take them with you

CONSTELLATION REPORT
Celestial Wanderer

C E N T A U R U S



This is one of the larger, more impressive southern constellations and one of the original 48 recorded by Ptolemy in 150 AD. This constellation is home to the closest star, the closest radio galaxy and the biggest globular cluster – as well as a host of other deep sky distractions. So get your gear out and ride with me as we tame this celestial show pony!

Meaning
Centaurus represents the centaur, a half man half beast creature of Greek mythology. They were split into two sides – one headed by Chiron was wise and educated and the other was wild and unruly. Astronomers are unsure whether the wild group is Centaurus or Sagittarius which also depicts a similar creature. Personally, I think these wild centaurs are real and can often be found in any Australian pub after 10pm!

Size
1060.52 square degrees ranking it 9th out of 88.

Brightness
Ranked 25 out of 88.

Brightest star
Alpha Centauri which has many claims to fame also has a few aliases including Rigel Kentaurus and Toliman. Alpha Centauri is the third brightest star in the sky outshined only by Canopus and Sirius. It is the closest star apart from our own Sun to our Solar System being only 4.35 light years away. It ranks as probably the best binary star system in the sky consisting of a mag 0 primary spec (G2V), similar but 2 billion years older than the Sun with a mag 1.4 spec (KIV) orange dwarf companion orbiting each other in roughly 80 years. Separation varies from 21" in 1985 to 1.7" in 2020.

A third red dwarf spec (M5.5Ve), known as Proxima Centauri, lies 4.22 light years away – a little closer than the other two. However, it lies a full 2 degrees away from the Alpha Centauri pair and at mag 11.2 in a crowded star filled region, it's a difficult find. Assuming it's part of the Alpha Centauri system its orbital period must be measured in millions of years. However a possibility is that it is a proper motion travelling companion not an orbital one.

Proxima Centauri is also known as V645 due to flare activity which causes it to brighten up to a magnitude in brightness.

All three have recently been precisely measured. Alpha Cent (A) is 1.22x the Sun's size, Alpha Cent (B) is 0.86x the Sun's size and Proxima is only 1.5x larger than the Jupiter.

Visible stars above mag 5.5:
101

Constellation visibility
Completely visible south of +25°
Completely invisible north of +60°

Asterisms
The Pointers – represented by two bright stars, Alpha and Beta Centauri mags -0.3 and +0.6, which point to the rough direction of the Southern Cross, In actual fact they point to an area somewhat north of the cross. If we could come back around AD4000 (life after death debates aside), one would find the motion of alpha Centauri would make the pointers aligned with the centre of the Southern Cross. Come back around AD6000 and the motion of the Alpha Centauri would put it only 23 arc secs north of Beta Centauri, forming a spectacular optical double for future generations to enjoy. (I don't care what anyone says – I'm coming back for that one!).

Meteor showers

Alpha Centauri has a lesser known claim to fame being the radiant (central point) for a meteor snhower which occurs from Jan 28 to Feb 23, known as the Alpha Centaurid shower. The maximum occurs around Feb 8 but is variable ranging from 5 up to 20 per hour. What makes it exciting is the high percentage of multi-coloured fireballs of which 30% leave luminous trains of dust and gas – sometimes lasting several minutes.

The Alpha Centaurids are an old meteor shower shoes parent comet is unknown. Best displays occurred in 1974 and 1980 when many reports of unusual sky phenomena were reported by the general pubic. This is one meteor shower where spectacular colours covering the entire spectrum can be seen. (For information on watching/photographing meteor showers contact James or myself, Grant, during AGWA meetings.

History

One of the original 48 constellations devised by Ptolemy and included in his Almagest to which he assigned only 37 stars including those in the Southern Cross. Centaurus is now very difficult to see from Greece where it was named 2000 years ago, because precession of the Earth has moved Centaurus 10 degrees closer to the south Celestial Pole.

Best Double

Excluding the obvious (alpha Centauri) whose details are already listed (see Brightest Star), I choose 3 Centauri RA 13 h 51, dec -33 00. Discovered by John Hercshel in 1835, it consists of a spec (B5IIIp) giant star with peculiar spectral lines and a spec (B9IV) sub giant star. Orbital period is unknown but the separation is slowly closing, down from 8.5" to 7.9" arc secs.

The stars are mags 4.6 and 6.0. Distance is estimated at 300 light years making them possible Scorpius/Centaurus association members?

Centaurus is full of interesting double stars. Others I recommend for observing enjoyment are N, Q, J Centauri also known as Rumker 18, Dunlop 141 and Dunlop 133. (Contact Grant Thornett for any further details through AGWA)

Best Variable

R Centauri RA 14h 16, dec -59 55 is a long period Mira type variable of 546 days. It is a spec (ML-8IIe) pulsating bright giant nearing the end of its life. It is unusual due to the fact it shows a double set of maximum and minimum variations ranging from 5-9 mag in one set period of 546 days then changing to 6-11 mag the next set period. What causes these changes from one set of variations to the next is a mystery that needs more study.

Best Open Star Cluster

NGC 3766 RA 11h 36, dec -61 37, is a rich cluster of 300 stars in a rough spiral pattern. Even small scopes show about 80 stars of many colours and brightnesses, larger scopes bring out its true beauty. It's located about 7000 light years away in the Carina/Sagittarius spiral arm. Its stars spread out over 25 light years of inter-stellar space. Its age is estimated to be quite young at about 20 million years and at 4.6 mag is visible to the naked eye in dark sky conditions.

Best Globular

Omega Centauri (NGC 5139) RA 13h 26, dec -47 29, one of the most impressive show piece objects in the sky. This globular to my mind shares dual number 1 status as the best of the 250 odd globulars (sharing its status with 47 TUC) At Mag 3.6 it appears as a fuzzy star to the naked eye, which is just what Ptolemy thought it was when he named it as the 24th star. Hence, its name (Omega Centauri). Edmund Halley discovered otherwise in 1677.

Omega Centauri appears through scopes of any decent size (3 inch upwards), as a dense, slightly elliptical ball of 3-5 million stars easily filling the view of a low power eye piece. Omega Centauri is about 16,000 light years away. Recent studies show three distinct age groups of stars in Omega Centauri. This is unusual in globulars, so that it may actually prove to be the core of a dwarf galaxy swallowed by the Milky Way in times past. A similar object to M54 in Sagittarius, which appears to be the core of the Sagittarius dwarf, the Milky Way's current munch!

Best Nebula

NGC 5367/IC4347 RA 13h 57, dec -39 59 is a bright twin lobed reflection nebula marking the head of the cometary globule CG12. The illuminating source for the brightest patch is h4636 (mags 10.3 and 10.7, separation 3.7"). Both sections of nebulosity were visible in a 4" refractor from suburban skies despite the fact that knowledge of its actual mag is a mystery!

Larger scopes may also show the dark nebular associated with it, Bernes 146, under dark sky conditions. The whole complex of nebulosities is distance-wise about 2000 light years away.

Best Planetary Nebula

NGC 3918 RA 11h 50, dec -57 11, is a bright mag 8 planetary showing a disk 12" across which is nicknamed The Blue Planetary due to its vivid colouration. Distance is currently unknown and the central star is quoted as having a mag anywhere between mag 10-15, so that it may be variable?

Another bizarre object suitable for bigger scopes 8-10" and above is HE 2-111. At mag 12.0, a probable planetary 25"-15" across.

HE 2-111 lying close to Alpha Centauri, RA 14h 33, dec -60 50 has the fastest wind speeds of any planetary (400km/sec). It is surrounded by a faint halo, making the nebula's actual size 102" x 47" across. Some astronomers have pointed to the positional coincidence between this object and the event of AD185 recorded by the Chinese (see Interesting Facts!)

Best Galaxy

NGC 5128 RA 13h25, dec -43 01 is also known as the Radio Galaxy (Centaurus A). This is a supergiant type 50 pec interacting galaxy choking on the remains of a large barred spiral whose only distinctive feature now is its dust lane. At mag 7 NGC 5128 is an easy binocular object and maybe even a naked eye object from a perfect dark site? At only 11 million light years it shows up well in any scope, but larger scopes are needed to see the detailed structure that makes this galaxy so famous.

Discovered by James Dunlop in 1827, NGC 5128 is part of a cluster whose members include NGCs 4945, 5102, 5253 and M83, plus others lesser known like 10mg dwarf galaxy UKS 1346-358 (ESO 383-987) RA 13h 49, dec -36 03.

NGC 5128 contains a large super-massive black hole which is emitting two plumes of radio emission. If the half digested spiral contained a black hole of its own this may just be the beginning of some real fireworks to come when they eventually merge!

This group is ideal for supernova searching due to its close proximity. NGC 5128 had one in 1986, NGC 5253 had two in 1895 and 1972, and M83 usually has one every 1-15 years.

Best Galaxy Group

A large group known as the Hydra/Centaurus Super cluster inhabits this section of the night sky, running from Hydra through Centaurus to Antlia. Known as Abelc 3526, RA 12h 48, dec -41 19, it is actually two distinct groups bound by gravity.

The first is led by NGC 4696, a supergiant elliptical (EI pec), a prominent radio and xray galaxy mag 10.7. this goupr is 165 million light years away and known as Centaurus 30. the second is Led by NGC 4709 another supergiant elliptical type (E1), lying 220 million light years away mag 11. this group is referred as Centaurus 45.

The two groups lie superimposed by our line of sight and so appear as one. Their separation was discovered through red shift measurements. Two other groups in Centaurus are also gravity bound to the Hydra/Centaurus Supercluster – Abell 3565 led by 10.5 mag IC 4296 (type EO) and ABell 3574 led by IC 4329 (type E3) mag 11.5.

The Hydra /Centaurus Supercluster offers a rich hunting ground for galaxy enthusiasts owning medium to large scopes 6-16". Have fun seeing how many you can bag in a night!

INTERESTING FACTS

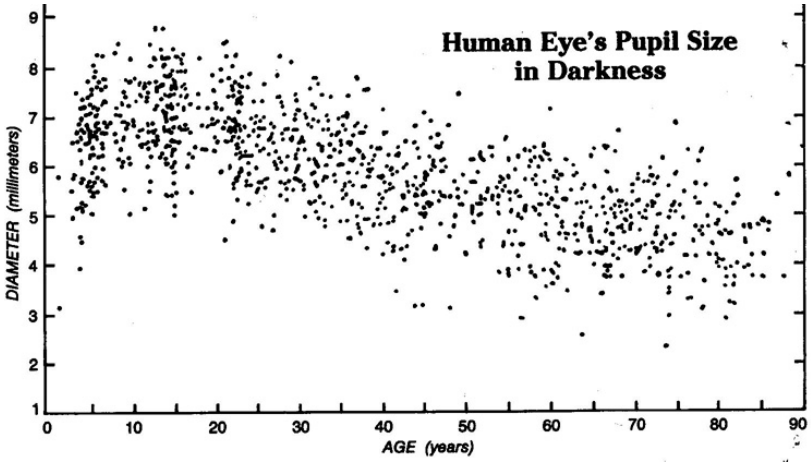
1. *A possible supernova was recorded by Chinese astronomers in AD185. Its remains, based on the supernova theory, are believed to be RCW 86, an obvious SNR. However, the position recorded is about 2 degrees north of RCW 86 matching well with He 2-111. He-2111 may be a symbiotic (old swelled giant/supergiant with close hot dwarf companion), whose interactions caused it to go nova, similar to R Aquarius 900 years ago. Its age also agrees well for a bright nova in AD 185*

2. *Centaurus contains two yellow hypergiants (Omicron 1, spec G4.0/Ia and V766 (double star Coro 152) G8-0/Ia). Both are variable stars and because these type of stars are rare – there are only 7 yellow hypergiants known – any information on unusual changes is much sought after by profession als to understand their stellar evolution.*
   A large number of the many bright stars making up Centaurus are B type stars from the Scor pius/Centaurus association. Most lie between 250-600 light years away and are held loosely to gether by gravity. Some like MU Centauri are known Gamma gas variables which throw or expel gas due to fast rotation. In truth, many of the stars in this association have and/or will experience gamma cas variations, so if one night a star is Centaurus looks slightly

MEASURING, NOT GUESSING, YOUR DARK-ADAPTED PUPIL DIAMETER!

Graeme Clement

This article is to draw to the members' attention to an important but little-recognised factor in observational astronomy: the measured**,** not guessed, diameter of one's dark-adapted pupils. Many of even the best-informed amateur astronomers assume that a young person's dark-adapted pupils are approximately 7 or 8 millimetres in diameter, those of a middle-aged person about 5 or 6 millimetres, and those of an elderly person about 4 or 5 millimetres. In many instances, however, this "rule of thumb" is very misleading, because at all ages there is very wide variation from the mean, as the accompanying graph demonstrates.



Over 1200 people had their eyes measured to create this graph of pupil diameter versus age. Clearly, the conventional wisdom that the human eye opens 7 millimetres in darkness is only a very rough average even for young people. Over age 50, a more realistic average is 5mm. Which of thee points would represent you? From a study by I. E. Loewenfeld published in Night Vision (National Academy Press, 1987).

Where do your pupils plot on this graph? Are they close to the mean? Could they be very large for your age, or perhaps very small? See below to find out how you can tell.

Question:
Why is my dark-adapted pupils' diameter important for me to know ?
Answer:
This is because if the exit pupil of your binoculars or your low power eyepiece is larger than your own pupils, you cannot see the entire field of view at one time, and so you have to move your eye or the instrument around a little to see all of it. Much more important than that, however, is the fact that it reduces the effective aperture of your instrument, like using a telescope or binoculars with smaller objective lenses or a smaller primary mirror. That is, you lose the benefit of the size of the instrument for which you paid.

Question:
How can I measure my dark-adapted pupils?
Answer:
To do this you need a Pupil Gauge, which is a thing not very commonly seen. Mine is the only one I have ever seen, and I know of no one else who has one. My Pupil Gauge is available for hire in return for a nominal fee of $1.00 a time. It is a small, flat piece of thin plastic which can easily become lost in a pile of papers or the like. So to protect my investment, I hire it out in return for a refundable deposit of $10.00 in addition to the non-refundable fee of $1.00.

Question: How can I find out the size of the exit pupils of my binoculars and of my low power eyepiece ?
Answer:
For binoculars, you divide the diameter of the objectives by the magnification. For instance, 7x50's produce exit pupils of 7.1 millimetres, and 10x50's exactly 5 millimetres. To calculate the exit pupil of an eyepiece, divide the focal length of the ocular by the focal ratio of your telescope. My two 32 millimetre eyepieces, for example, when used in my f/6 telescope, produce exit pupils of 5 1/3 millimetres. The size of your fully dark-adapted pupils, as after two hours at a very dark site, is not a suitable criterion for determining your maximum focal length for a low power eyepiece. This is because if you were to buy such an eyepiece (or binoculars), its exit pupil would be too large for your dark-adapted pupils at a light polluted site, where your pupils would not dilate nearly so much. To allow a realistic margin for observing at light polluted sites, the directions for my Pupil Gauge indicate one should use it after only twenty minutes in a dark room.

An alternative to using a Pupil Gauge is to try eyepieces of various long focal lengths in your telescope (and a variety of binoculars) at a suitable site with a high level of light pollution. This, however, would be very inconvenient, time consuming and, in most instances, impractical (and how do you know what level of light pollution is required for the purpose, let alone knowing of such a site?). By contrast, one can do much better in twenty minutes with a Pupil Gauge and come away with a definite, reliable, maximum suitable focal length for observing in all light-pollution levels. The "Lowest Useful Power of Magnification" listed in the specifications of commercially produced telescopes is that which will produce an exit pupil of 7 millimetres. The basis for this is the premise that most people's dark-adapted pupil diameters are 7 millimetres. The graph demonstrates the fallacy of such premise.

When you have measured your dark-adapted pupils, you can then use your measurement much more validly than such specification in your telescope instruction manual; and you will know your low power eyepiece and binoculars, when you have subsequently bought them in accordance with your measurement, are right for you.

In view of the foregoing, I feel sure you'll agree that it will be a dollar well spent. It will help you derive the most from your binoculars and telescope, improving your images, and thus increasing both the practical and the psychological benefits of your observational astronomy. After all, isn't that what it's all about? (If this article seems a little "hard-sell", it is because the response to my previous articles on this topic has been almost non-existent. (I have had my Pupil Gauge about five years. In that time I have written numerous articles in club newsletters recommending that members use it. In all that time, however, only five people have done so to date. Perhaps I am to blame for not making clear how important it is. (There must be very few members out there who know the size of their dark-adapted pupils. Of the remaining great majority, many are consequently using inappropriate low power eyepieces and/or binoculars. (I stand to gain very little in the way of remuneration by hiring out my Pupil Gauge, and that is the way I want it. My motive in writing articles such as this is not a mercenary one, but is to help as many members as possible to gain the most from their observational astronomy - which is exactly what an astronomy club is for.)

I can be contacted on 9443 1201 or 0414 506 054 to arrange exchanges of my Pupil Gauge for $10.00 cash, of which I will refund $9.00 on return of my Pupil Gauge.

ASTRONOMY WORKSHOPS

One to one visual astronomy workshops designed to increase a person's seeing/recording capability are now available!

The workshops will be based on the individual's interests and observing ability over a period of 6 weeks – one night a week.

All workshops are practical observing under night sky conditions, structured according to your needs.

For more details contact Grant Thornett at AGWA meetings or on 9448 1617.

FREE TO GOOD HOME

One Celestron collimating tool for Newtonians.

Consists of a translucent white plastic disc with a one millimetre hole in its centre and a concentric opaque black annulus.

Used exactly the same way as a Cheshire eyepiece but requires more ambient light. Price includes a copy of original directions for use.

After sales assistance to understand obscure language of instructions (not Japanese- or Chinese-English, but American) available to approved purchaser!

Price: zilch. Contact Graeme Clement on 9443 1201 or 0414 506 054.

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