THE JUNIOR ASTRONOMER

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The Journal of the Junior Astronomical Society

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THE JUNIOR ASTRONOMICAL SOCIETY

Editorial

Following the Council's decision to award an annual prize for the best original work made by a Society member below the age of 16, notice is hereby given that the first prize-giving will take place at the Annual General Meeting to be held in London during 1955. The closing date for the receipt of entries is January 31st, 1955; all entries must contain the name and address of the author and the location and instrumental situations if used in the course of the work. The prize essay will be published as a separate publication of the Society. Contributions are to be sent to the Secretary, Mr. E. W. Turner, F.R.A.S., 35a, Third Avenue, Walthamstow, London, E.17.

The Missing Planet by R. M. Baum, F.R.A.S.

As far back as Kepler's time, the great gap between the planets Mars and Jupiter had attracted some speculative attention, and Kepler had gone so far as to state that a planet would one day be found there. However, it was not until the year 1772 that notice was again paid to this subject, for in that year one Professor Johann Titius of Wittenburg pointed out a curious resemblance between a certain series of numbers and the distances of the planets from their primary. It was found that this sequence closely approximated the latter to a remarkable degree, but little notice was given to this harmonious relationship until Johan Elert Bode, after whom the so-called law is now named, first brought it to popular attention. Though it was found that the resulting numbers closely followed those of the planets from the Sun, a gap existed in the sequence, whereas Mars had its number as did Jupiter, there was no known body betwixt the two to account for the Titiu-Bode quantity. This interesting fact brought up the matter afresh and the possibility of another planetary body in the assigned place considered. Support for this contention was forthcoming in the discovery of Uranus, for it was found that the actual distance of the latter fell just short of the sequence value. So strong was the lost planet fever that in 1785 Baron Von Zach computed the elements for the unseen object, but again little was done to action this and some fifteen years were to elapse before work was commenced on a planned search for the hypothetical planet. At last on September 21st, 1800, Von Zach, who had kept the search in mind since 1785, succeeded in calling together a congress of 24

astronomers to be held at Schröters Observatory at Lilienthal, the express purpose of which association being the division of the zodiacal constellations into 24 zones, each region being in the care of one of the chosen observers. However, before work could commence news arrived that the body had been found, quite by accident, by Piazzi at Palermo in Sicily, who had been reserved a place in the so-called 'celestial police' of Von Zach, but who had not actually received any notice of such appointment.

Whilst engaged in making observations for a star catalogue he was compiling, Piazzi on the 1st January, 1801 detected a faint star amongst those of Taurus. On the second night the body had shifted its position and by the third Piazzi was assured of its motion and it was assumed that he had discovered some form of tailless comet. He continued to watch the object in its orbit up till the 14th February, upon which date he was taken seriously ill resulting in the interruption of the observations. Before he was struck down Piazzi had despatched two letters, one to Dr. Bode at Berlin and the other to Oriani at Milan. When the news reached Bode excitement was rife and several attempts to compute elements for the body made. Too few observations hampered the computers in their labours, though for never before had so few records been utilized for this purpose. Hope was restored to the drooping band of observers by Gauss, then an unknown tutor. Using his new method of least squares the young man prepared fresh elements and presented a new set of positions. Following on this the days of the runaway planet were numbered, and its rediscovery imminent.

On the last day of the year 1801, the sky which had hitherto been cloudy, cleared and a hard frost set in, and there in the north-west part of Virgo stood the planet, almost exactly in the position assigned to it by Gauss. Von Zach saw the planet on this evening, whilst on the anniversary of the original finding Olbers at Bremen also saw it. To this body, the first of the asteroids or minor planets to be discovered, the name Ceres was given and with its detection it was generally thought that the remarkable law of Titius had been rendered complete in so far as its practical application was concerned. Yet on the 28th March, 1802, Bode, who in his previous observations had become familiar with the faint stars in the vicinity of Ceres, found another bright stranger. This second body was called Pallas.

With this the philosophical world was puzzled. One new planet had been expected and had been found, but now a second had been discovered, and the orderly flow of things interrupted. Olbers suggested what was considered a daring theory, the assumption that the two planets Ceres and Pallas were the fragments of

a primordial trans-Martian body that had been disrupted in some remote age. Following on this suggestion Olbers stated that more of the fragments would be found. By 1807 two more pieces were known, and today some 1,500 or so are listed, with no doubt many more tiny specks that we may never see.

Olber's theory, though plausible and suggestive of the truth, has never been favourably regarded by the majority of astronomers, but it must be confessed that with the present unsatisfactory condition of cosmological research it cannot be lightly set aside.

How to make a Telescope from old Binoculars by J. H. Peters.

Many an attic has some old binoculars among its junk. They may be badly damaged but as long as one of the object lenses (i.e. the large diameter lenses) is intact all is well, for that is all you require for the object lens of your telescope. The eye lens consist of a small magnifying lens such as is found in a pocket magnifying glass, or better still a watchmaker's eyeglass.

Construction: The first thing to find out is how long the telescope tube is going to be. It is approximately the sum of the focal lengths of the object lens and eye lens. To measure the focal lengths, take the object lens and go to the wall remotest from the window of the room in daylight—if the wall is light colour so much the better, if not, hold a piece of white paper on the wall—and by moving the lens away from the wall with its plane parallel to the wall, an image of the window frames will appear on the wall. Having focussed the window, if the lens is now moved a little closer to the wall, the distant trees and clouds will come sharply into focus. With the lens in this position get someone to measure its distance from the wall. This is approximately the focal length of the lens. The focal length of the eye lens may be found by the same method.

The focal length of the object lens may be 6 inches and that of the eye lens 1 inch, in this case the lenses would have to about 7 inches apart in the tube and magnification, which is the focal length of the object lens divided by the focal length of the eye lens, would be $6/1 = 6$ times.

The tube may be conveniently made from the Manilla paper cover of an old school exercise book. This, when removed and opened out, measures approximately 8 inches by 12 inches. With the aid of pins and "Cellotape" this can be rolled into a conical tube to fit the object lens at one end and the eye lens at the other, the ends being trimmed off parallel with a pair of scissors. The

object lens is best left in its screwed mounting and bound with wire when it is in the tube; while, if a watchmaker's eye glass is used, the small end of the tube may be made a nice 'slide' fit for it, to facilitate focussing.

My first telescope was made this way and I have helped several boys to make similar instruments. The results are most satisfying and as Dr. Porter wrote in his article in our first Journal "Any glass is better than no glass at all".

Some observations of the planet Mercury and of O'Neill's Bridge on the Moon, 1954 by C. A. G. Bearpark.

Mercury: Greatest Elongation East took place on February 13th when the angular distance was 18°, and its time of setting about 1825 hrs. According to Whitakers Almanac it was 5° above the horizon at 1818 hrs., sunset being at 1710 hrs. I thought therefore that on this Saturday evening some time might profitably be spent in endeavouring to observe this elusive planet. At 1730 hrs. I put on some warm clothing, slung a pair of 10X40 binoculars around my neck and went out into the garden. To the west lay some light banks of cloud with clear gaps between them. My western horizon is assessed at roughly 5° above the true horizon owing to a slightly rising ground, and I expected to be disappointed but hoped for the best. Half an hour's constant searching with the naked eye and frequent sweeps with the binoculars, plus a short period of sweeping with my 6-inch reflector, revealed no trace of Mercury.

At 1810 hrs. I thought there was very little point in waiting any longer, so the telescope was shut down, the dome shutter closed and a start made back towards the house. Halfway there I casually looked toward the west and lo and behold there was an unmistakable bright object. Binoculars revealed it as being far too bright for anything other than the planet. Observations with eyepieces of 50, 100 and 200 on the telescope failed to resolve the planet into a "phase" and all that could be seen was a blurred image. The reason for this I attributed to the low altitude and the consequent atmospheric disturbances close to the horizon.

When first observed I assessed that Mercury was about 2° above my visual horizon (i.e. about 7° above the true horizon) so that but for the cloud banks it would have been a conspicuous naked eye object about half an hour sooner so far as I was concerned.

O'Neill's Bridge: According to data and diagrams supplied by Dr. H. P. Wilkins and Mr. P. A. Moore, the correct time to look for this feature is two days after full moon, when the sun is

setting on the western side of Mare Crisium. On the 20th February last, at 2230 hrs., I was enabled to observe the exact place of the bridge, where the spot of light should have been, but nothing was seen. This may have been due to three causes. (1) that the slightly tremulous air on that occasion destroyed any hope of observing an exceedingly delicate feature; (2) that a power of 200 with my 6-inch reflector is not enough; and (3) that the feature was not visible on that night in any case!

Shooting Stars or Ignorance is Bliss by S. Bradford, Director, Sky Survey Section.

Is a shooting star really a 'shooting star', one that has lost its hold on the firmament and comes tumbling down away into space? Of course it is not. A shooting star is the familiar term for what scientists call a Meteor. A meteor is a tiny fragment of solid matter, which varies in size from something smaller than a pin head to occasionally as big as a wardrobe. The largest type, owing to its size, may resist the friction of the atmosphere and reach and penetrate the earth's surface. As the effect of such an impact is sometimes disastrous it is fortunate that such Meteors are extremely rare. On the occasions when the Meteor arrives on the Earth it changes it's name from Meteor to Meteorite in much the same way as a young lady changes her title from Miss to Mrs. when she has succeeded in rocking a young man off his feet!

Fortunately, it is the tiny meteor with which we are most familiar and which can be seen in greater or lesser numbers every night of the year. This tiny meteor is composed of elements and compounds similar to that of which the earth is constructed—i.e. iron, silica, granite, carbon, diamond, etc., but don't run away with the idea that you can make a comfortable fortune by collecting meteorites, because you don't know that the meteor is there until it has gone!

We are only aware of the existence of the meteor during the last one or two seconds of its lifetime when we actually see it being burnt up and transformed from a solid body to a gaseous condition before it disappears for ever.

Meteors generally travel in well defined orbits, crossing the orbit of the earth round the sun at the nodes. If the earth is close to a node at the same time as the meteors, some of the latter are drawn into the earth's atmosphere resulting in the wonderful displays which we sometimes see. We name these displays after the constellation in which they appear, thus we have the Lyrids, Perseids, Orionids, Leonids, etc.

The meteor is travelling at a tremendous speed when it enters our atmosphere and the resultant friction causes it to glow and then to ignite the rarified gases in the upper atmosphere. The flash which we see is frequently 5-6 miles in length and occurs at an approximate height of 50 to 70 miles above the earth's surface. It is remarkable that such a tiny object should cause so much disturbance, but their effect would be much more disturbing and uncomfortable for us if our atmosphere were less dense. We would then feel the meteors raining down on us day and night and it would be necessary to walk around in protective clothing to prevent being riddled with meteor holes! Imagine humanity having to live its span encased in a suit of special armour! Verily, how fortunate we are to live on such a well conducted planet where the same atmosphere which protects us from bombardment by these meteors puts her tongue in her cheek and pelts us with pouring rain!

1954 is a poor year for visual or photographic observation of meteor streams, so we shall have to leave them to our radar observers who can observe under all conditions of moonlight, cloud or rain. A display of meteors will occur during the period August 4-16th with a radiant in Perseus, but the moon, dusk and dawn tend to make poor visibility. The writer would appreciate details from any observers of this shower (maximum number per hour about 50/80 around the 12th August as he wishes to compute the hourly rate.

Society Notices — Future Events

August	21st, 1954.	Annual Meeting, Morley College.
September	5th, 1954.	Autumn meeting of the Oxshott Group. Telescopic observation of the Moon.
	24th, 1954.	Morley College, 61, Westminster Bridge Road, London. President's account of the total eclipse of the Sun as seen from Sweden.
	28th, 1954.	City Literary Institute, Drury Lane, London. Course in Elementary Astronomy begins. Early enrolment necessary.
October	1st, 1954.	Morley College course in "Astronomy for Beginners" commences.

Members wishing to attend any of these events should contact Mr. E. H. Noon, Norman Cottage, Pond Piece, Sheath Lane, Oxshott, Surrey. (Oxshott 297).

The regular appearance of our Journal depends upon faithful remittance of subscriptions, and will members who have not yet paid their subscription for the present Session, March 1954/March 1955, please kindly send them as quickly as possible to the Treasurer, Mr. H. J. Lewis, 96, Moring Road, Tooting, London, S.W.17. Cheques, Postal Orders, etc. should be made payable to the Junior Astronomical Society.

Did the Ancient Peoples make Telescopes? by Nimrod.

The Italian philosopher Galileo, following up the accidental discovery of the Dutch spectacles-maker Lippershey, constructed a telescope magnifying 3 times (about 1609), followed by a second X 32. But as to much earlier times—well! To begin with, when DID man first discover how to make glass? The Egyptians and Babylonians seem to have known it, and since glass is made by melting sand and alkali such as soda or potash, we suspect that maybe it was accidentally produced in the beginning by fires burned in sandy (desert and seashore) regions, (wood-ash and seaweed—ash contains potash). We can imagine the surprised desert dwellers pulling out the strange, transparent lumps from the ashes next morning and looking through them! Some would be accidentally more or less lens-shaped, and that would magnify things.

To proceed:—(1) A lens made of rock crystal was discovered at Nineveh, Ancient Babylon, about a hundred years ago. (2) The Carthaginians (you can date them back to 800 B.C. I think) carved tiny figures on circles—as many as 15 humans in a circle of diameter only $\frac{1}{2}$-inch! One artist wrote the whole of Homer's Iliad on a piece of parchment which wrapped into a nutshell! A sculptor is said to have made a four-horse chariot which could repose under a fly's wing—surely they used magnifying glasses? (3) Democritus (about 7th Century B.C.) asserted that the Milky Way was made up of "countless stars". It takes a telescope to see that. (4) At about the same time, Anaxagoras (quoted by Diogenes Laertius) declared that there were mountains and valleys in the moon. DID the Ancients grind, cut, and polish lenses out of rock-crystal? (5) Aristophanes (around 450 B.C.) says that glass was sold in the shops of Athens. (6) Ptolemy Energetes (250 B.C.) erected an "instrument" on the great lighthouse at Alexandria for seeing ships "at a distance". Was it a telescope of some sort? (7) Ptolemy the philosopher tells us in his "Optics" that a ray of light is refracted (bent) through a glass prism. That would be around 120 A.D. (8) The Romans (who learned all their science from the Greeks) used glass globes to concentrate the sun's rays to cauterise

(i.e. burn) flesh, in the medical "operations" of those days. (9) Archimedes, the great early scientist of Syracuse (around 250 B.C.) is said to have set enemy ships on fire by "burning-glasses" on the roof of a house (using the sun's rays). Is it not wonderful?

A Letter from a Swedish Member

Dear Members,

My home town, Eskilstuna, is situated in the province of Sodermanland, in the southern part of central Sweden, near Lake Malaren. This is one of Sweden's largest lakes, and the Malar region is one of the most beautiful parts of Sweden. Eskilstuna is a typical industrial town and is called Sweden's Sheffield, being famous all over the world for its knives. The Bolinder-Munktell agriculture machines come from here too.

As far as I know, Eskilstuna has no astronomical associations, but a J.A.S. friend and I are hoping to find more members and perhaps open a local group here. My interest in astronomy is very old although I didn't know much about the science until last year when I read an article on star observations and general astronomy. My interest grew and I read many books on the subject. Last winter I often went out observing the stars, and watched the visible planets from night to night, noting their apparent motions. Early this year I watched Mars and Saturn when they were at their closest to each other, and it was also possible at the time to see Uranus in Gemini (Tvillingarna) with the naked eye. I also saw many meteors.

I wrote to the author of the article, an astronomer from Sodertalje, and I had a very kind and obliging reply, which encouraged me to continue with my observations. My interest grew rapidly, and when I heard of the existence of the J.A.S. I was very glad to join, and it's unnecessary to say that I am very pleased to have done so.

I shall be at Eksjo on June 30th to watch the total eclipse of the sun. If the weather is kind I hope to take some photographs of it, and will certainly send a report in for the Journal.

With kind regards,

Lars Helander.

A new member, Mr. A le-Boutillier, of Chingford, London, has very kindly presented an Addressograph machine to the Society, and we have much pleasure indeed in placing on record our sincere thanks to him for his most generous and extremely useful gift.

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THE JUNIOR ASTRONOMICAL SOCIETY

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