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Derby.
THE PLANET SATURN AND ITS RINGS, 1954

As seen on June 3rd 6h. 45m. U.T., with the 24-inch objective
of the Lowell Observatory, Arizona, by D. P. Avigliano.
A NOVEL SEARCH PROGRAMME—OUR FRONTPIECE

Early in 1954 news reached the "Vega" office of the publication, by H. H. Kritzlinger of Karlsruhe, Germany, of a set of provisional elements together with a search ephemeris for a postulated trans-Plutonian planet, i.e., a planet circling the Sun in an orbit outside that of Pluto, the outermost planet of our system as yet revealed. This interesting data was issued in the "Nachrichtenblatt der Astronomische Zentralstelle" 8 Jahr. No. 1. Subsequently abstracts giving a copy of the ephemeris appeared in the American publication "The Strolling Astronomer" and the British one "Vega". Probably the most outstanding property assigned to this hypothetical planet according to Kritzlinger is its relatively high magnitude, for whereas Pluto's is 15, this other is 11. Assuming that no inaccuracies have crept into the calculations and given that the planet does indeed exist, then it would seem that a 3 inch telescope charged with a low power, or better still, a comet eye-piece should prove sufficient to sweep for it. Strange to relate, this news, for all its stimulus, has attracted but very little notice, and as we go to press we have not heard of any official search projects having been inaugurated. Perhaps the fact that the original announcement was in German is the cause of this apparent lethargy. However, though news in this respect from the professional field is not forthcoming, we were surprised to learn, shortly before putting this issue to bed, that two of our younger members, Richard Spencer and Charles Prescott, both of Chester, after having read the notice in "Vega" about "Planet TP", as it might somewhat cryptically be named, resolved to set about sweeping for it, using a 3 inch Broadhurst Clarkson refractor. At the present time our two very industrious colleagues are busily engaged upon charting all the objects, lying within the light grasp of their instrument, which are situated close to the predicted path of the planet. In order to prepare this map a large scale skeleton map of the zone which lies a little way to the east of the star Delta Corvi in R.A. 12h. 33m., Dec. 15 deg. has been constructed. Upon this stars down to the 7th magnitude have inserted from Norton's Star Atlas, and these used as basic reference points from which to measure the rough positions of fainter objects. This when done enables these features to be roughly entered upon the field map with a certain amount of accuracy. It will be appreciated that this task requires a great deal of patient and careful observation, with each star being noted not only according to its position, but also to its brightness, colour, and whether or not it shows any peculiarities, such as being a variable or perhaps a double star. Following the completion of this preliminary survey, our two
colleagues will keep a careful watch on the zone for any object showing appreciable motion or which subsequently enters the field. We wish our two colleagues the best of success. Even though they may not, for many reasons, discover the assumed planet, they will discover that the essentials of the astronomer, whether he be professional or amateur, must be patience, perseverance and care, the practice of which brings experience and skill, and above all, critical objective recording untinged by any bias.

With this issue we have great pleasure in presenting the first of a series of frontpiece illustrations. This originally appeared in "Vega", October, 1954, from which periodical we have been pleased to obtain permission to reprint. It is a very beautiful drawing of the planet Saturn, taken on June 3rd, 6h. 45m. U.T., 1954, with the 24-inch refractor of the Lowell Observatory at Flagstaff, Arizona. Seeing conditions at the time were not too good and Avigliano had to stop down the aperture to 12 inches. Later seeing improved and he was able to increase the aperture to 17 inches. An eyepiece of power x810 was used. Much detail is shown, as can be well seen, especially around and within the North Equatorial Belt. Several divisions are shown in the rings, more than are usually mentioned in textbooks. Also the shadow of the globe on the rings is plainly marked. We hope in a coming issue to present yet another fine contemporary piece of astronomical art, either visual or photographic.

RICHARD BAUM.

A REPORT ON THE EXHIBITION HELD AT MORLEY COLLEGE

Our thanks are due to the many J.A.S. members who contributed to the success of our annual exhibition held on May 14th last. Amongst the many models displayed there was a very instructive "3D" representation of the 24 bright stars nearer to the Sun than 10 parsecs. This was ingeniously and accurately made by Mr. R. D. Watkins, the Director of the Scottish Branch of the Sky Survey Section. A really rigid telescope stand with equatorial head made by Mr. McLean showed how simple the finding and following of a star could be. Amongst the many drawings, photographs and charts exhibited, credit must be given to a number of members for sending in carefully made lunar drawings made from personal observation. A composite star chart of the middle heavens made by students of Morley College and the City Literary Institute was a splendid example of team work. A fine photograph of the Pleiades taken by Mr. Roberts, of Swansea, was accompanied by a chart of the same group, made to sparkle in a most realistic way by reflected light. A number of working and illuminated models illustrated the retrograde motion of Jupiter, the daily change of position of Jupiter's satellites, the phases of Saturn's rings, the diurnal motion of the stars, the 1954 total eclipse of the Sun, and dominating all was a
large composite photograph of the Moon compiled by Mr. E. A. Whitaker from the superb Lick Photographs. Members were able to measure on a photometer the variation in brightness of an artificial Cepheid, and a carefully drawn set of light curves made by Mr. Litton illustrated several types of Cepheids. The chief value of this exhibition was to demonstrate how easily teachers and group directors could make similar models for instruction. Great interest was shown by the many visitors who afterwards packed the lecture room to see three short films, "Explosions on the Sun," "Grinding the 98-inch Mirror" and "The Rotation of Jupiter and Shadow Transits."

E. H. Noon.

**LIFE ON OTHER WORLDS**

By R. S. Atkinson, F.R.A.S.

There has always been speculation as to the possibility of other inhabited worlds, perhaps more so in these days when we hear so much about the possibilities of interplanetary travel. We believe there are other planetary systems far out in the depths of space, but these are too remote for us to study. We have, therefore, to investigate the solar system of which our homeland is a member and also to bear in mind the fact that the only kind of life we are familiar with is that which lives, or has lived, on our earth.

Before anything can live, certain physical considerations have to be fulfilled. A suitable temperature is one. We all know that nothing can survive intense heat. Even though some forms of life can withstand extreme cold they are usually in what the biologist would call a state of suspended animation. Then again, by virtue of the fact that living animals are dependent on oxygen, and plants require carbon dioxide, it is vital that any abode of life shall have an atmosphere containing the correct amounts of these gases together with a virtual absence of dangerous gases, such as ammonia. Water, in the form of liquid or vapour, is another necessity, since it forms an essential part of the bodily tissues of both animal and plant life. Yet another important necessity for life is suitable soil conditions. Little or nothing can grow or live on the solid ice flows of our polar regions or in the great sandy deserts existing in certain parts of our planet.

Having considered some of the requirements for life we can now pass on to examine the physical conditions of our fellow planets. With the aid of delicate scientific instruments used in conjunction with their large telescopes and spectroscopes astronomers have collected a great deal of information which enables them to form opinions for or against the possibilities of life on other worlds.

Perhaps it is natural to begin by surveying our own neighbour, the Moon. Those who have seen it through a telescope of moderate size will know that it is essentially a world of rugged
mountains, innumerable craters and large areas which are called seas, though, of course, they are entirely devoid of water. Volcanic ash covers the surface, there is no colour, only a dark grey arid desert. Because of the low force of gravity any gases which might have formed an atmosphere have long since escaped from the lunar surface. Consequently there is nothing to temper the extreme heat of the Sun during the day or lessen the bitter cold of the night. Neither are there any clouds to form water vapour or rain. While it is safe to say that the Moon is quite unfitted to support higher forms of life, the possibility that some low form of plant life, such as a primitive type of moss cannot now be ruled out.

In recent years strange markings have been seen inside a few of the craters and some astronomers ascribe them to plants supported by wisps of carbon dioxide which may be seeping through cracks in the surface where the Sun shines on it.

The nearest planet to the Sun is Mercury, which, in spite of its small size is now believed to have an extremely tenuous atmosphere though of carbon dioxide. In addition the same face is always turned towards the Sun leading to temperatures sufficient to melt zinc on the sunlit side, while the other side must have eternal darkness conspicuous for its extreme coldness. The light reflecting power, or albedo, of the surface of Mercury is the same as that of the Moon which leads to the conclusion that this planet is also likely to be a world of desert plains and perhaps mountain ranges.

Venus, the nearest planet to us and our twin sister in size, has an extensive atmosphere through which we are unable to see the surface features. The spectroscopy tells us that the upper cloud layer, at least, contains abundant amounts of carbon dioxide but no trace of either oxygen or water vapour. Underlying this dense cloud layer Venus is believed to possess a solid surface on which conditions are somewhat similar to those appertaining to our Earth during the far off days of the Carboniferous period. Then the air was heavily laden with carbon dioxide and there were steamy swamps and forests flourishing in a very humid atmosphere such as may be found in our own tropical forests in the rainy season. Another picture suggests that Venus is a vast desert above which lies a choking atmosphere which effectively shuts off the Sun’s rays, truly a rather forbidding state of affairs.

When we come to consider Mars as an abode of life the situation becomes a little more hopeful, though still beset by serious restrictions. In the first place an atmosphere is present, even though it is rather rarified and contains only small amounts of water vapour, very little oxygen and plenty of nitrogen. Occasionally clouds are seen which appear to be formed of dust particles. On the whole temperature and other conditions are such as to make animal life just about impossible. Except near the Martian tropics when, at noon, it is about as warm as an English autumn day, the planet is a very cold world with exten-
sive desert areas probably composed of brown felsite and with little surface water. The other areas which vary in colour from green to dark brown may possibly be some form of plant life, such as a dry moss or green algae.

Jupiter and Saturn are quite out of the question as abodes of life. Both have extensive atmospheres consisting very largely of obnoxious gases such as methane and ammonia, with oxygen entirely absent. Whether life exists elsewhere largely depends on other worlds having conditions akin to those which we find on our homeland.

LUNAR DRAWINGS

By P. J. Cattermole

My Aim.—My aim in making drawings of the lunar surface, besides learning more about the strange features thereon, is to obtain a sketch of each formation I have listed on my study programme—this list includes 120 named features. To-date I have only been able to make very few, but whenever there is an opportunity to add to these I set up my telescope and start observing with this objective in mind.

The Telescope.—The instrument employed in this work is a 3-inch refractor. I have two eyepieces, x80 and x130 which I use for this survey. These have been found to be quite adequate.

My Drawings.—The method which I have found most useful for lunar sketching is that of line drawings. I feel that it is much safer for me to keep to this technique rather than adopt a more ambitious one which produces a much more artistic yet much more inaccurate effort. Perhaps as I get more experience I shall try some shadings with pencil.

Each drawing I make is made to a set plan of attack. First, I find the area selected for study, and then decide just how much of it I am going to set down. Second, using a low power I fill in the main outlines, then when this has been completed I insert the finer details. Finally, the finished sketch is checked with the telescopic view. Later the sketches are copied into my observing book, the year, date and time, the instrument used, magnification, seeing conditions and, lastly, my name being set to it.
My Results.—So far I have secured some 24 drawings of this kind. The first I ever made was that of Proclus, this was actually taken with a 12.5-inch reflector. This sketch is given as an illustration to this article.

What I Have Learnt From These Drawings.—In making these sketches I have learnt much. Firstly, I have increased my knowledge of the Moon's topography; I have become acquainted with many new areas, and have seen what they have to show in the way of detail. In addition I have also learnt how to find my way around the Moon, so that now I am very well acquainted with its surface formations. To me, at any rate, the Moon is no "dead world"; it is constantly unfolding its secrets and leading me on to discover fresh things about it.

PRACTICAL ASTRONOMY FOR THE HOLIDAYS

By J. H. Peters

Now that daylight is with us till almost bedtime there are few opportunities of observing stars. So why not observe the Sun? It cannot be stressed too often that the Sun must never be observed directly through a telescope as this is a highly dangerous thing to do (evely dangerous).

Let us observe the Sun's apparent motion throughout a long summer day.

Take a straight rod or cane. Stick it as upright as possible at the edge of a flat path so that the cane's shadow will fall on the path for at least 6 hours.

Next, take about two feet of string and put a loop on each end. Slip one loop over the cane and let it fall to the bottom. Then, holding a piece of chalk in the other loop and with string tightened, draw a semi-circle on the path.

Suppose it is exactly 9 a.m. B.S.T. (i.e., 08.00 hrs. G.M.T.). Put a chalk mark on the path where one side of the cane's shadow cuts the semi-circle, and do the same thing at each succeeding hour, being careful to use the same side of the shadow each time.

If you measure the angle through which the shadow has moved in one hour you will find that the angle varies from hour to hour. You will also discover that the summer rate of movement near noon is more than 20 deg. per hour. This, at first sight, seems surprising, as one is taught that the Earth turns on its axis at rate of only 15 deg. per hour.

(If you cannot see the reason for this seeming anomaly, move a lighted flashlamp bulb around a vertical pencil in a darkened room along a similar path to that traversed by the Sun, and watch closely the pencil's shadow on a flat piece of white paper).

As well as marking the shadow of the cane on the semi-circle it is instructive to chalk a cross at the end of the cane's shadow each hour and then note the line that is obtained by joining up these crosses at the close of the experiment.
If you repeat the experiment some weeks later you will most likely find that the angular rate of the shadow's movement is different for corresponding hours. Careful measurement will show that the shadow does not always point due north at 12 noon (i.e., 13.00 hrs. B.S.T.), in fact, it only does so at that hour on April 16th, June 15th, September 2nd and December 26th.

Apart from this last variation, for which even a perfect sundial has to be corrected, on some days for as much as 16 minutes, it becomes evident that a vertical stick is useless as a sundial. In another article I hope to describe how to make a useful sundial, but in the meantime I shall be pleased to hear from any member who has tried the experiment and of the discoveries he has made.

It is surprising how exciting these simple experiments can be.

FROM MEMBERS' LETTERS

Mr. R. David Watkins, M.Sc., who is Director of our Scottish Sky Survey Branch, has sent us a most helpful letter. We quote the following extract:

"You may be interested to hear of my telescope. For a long time I struggled with a home-made effort with a very small field of view. Then I had the wonderful opportunity of a five inch diameter achromatic objective lens with a focal length of 24 inches. This cost me only £1 ex-Government. With a suitable eyepiece I have managed to construct quite an impressive instrument out of it. It is ideally suitable for revelling in rich star fields at a magnifying power of about x30, splitting the reasonable doubles at about 20 in. of arc, and viewing the planets among the stars and the super for the Moon. Its low "F" number gives it certain advantages but, even when stopped down, it fails to stand up to high powers, such as are necessary for observing features of planet's surfaces. I could do with learning more about the various types of eyepiece, as well as being willing to help others to understand optics; I am glad to note you have an instruments section."

R. DAVID WATKINS.

ASTRONOMICAL NAMES AND TERMS (1)

Nova.—This is a star whose light is suddenly increased by many magnitudes through an explosive outburst. This is usually tremendous, sometimes lasting days, and in some cases has been seen in large telescopes. Nebulous clouds can be seen which may be the remains of explosions of years gone by. The Crab Nebula in Taurus is the remains of a nova which blew up and was recorded by the Ancient Chinese in A.D. 1054. The cloud is still expanding at a rate of 800 miles a second. Novae have been found in other galaxies.
Variable Stars.—These are stars whose light is observed to undergo either regular or irregular fluctuations. This usually stems from some internal cause. Periods vary from a few hours to as well over a year.

Variable Stars (2).—Eclipsing Binaries: Some stars show a variation in their light because they have a faint or dark companion revolving about them in the line of sight which partially or totally eclipses them.

Binary Star.—This is a name given to two stars which move in orbits around one another under their own gravitational attraction. In other words, they swing about a common centre of gravity. Sometimes these stars are so close together, or so far away from us, that we can only tell that they are binaries through reason of the fact that their spectra appear to superimpose and then to separate again. These are generally known as Spectroscopic Binaries.

E. W. TURNER.

SOCIETY NEWS

The Visit to the Science Museum.—The gathering of members and friends on Saturday, April 16th last, was so large that it had to be divided into three groups for a tour of the Astronomical Gallery. Mr. Patrick Moore conducted the younger members. Mr. S. H. Groom took those who were interested in the Solar System, and the President took those wishing to see the Instrument and Galactic models. Afterwards we assembled in the Lecture Hall to hear Mr. S. H. Groom lecture on the measurement of time. This was followed by a special J.A.S. meeting at which the President introduced new members to the Council Officers. Finally, Patrick Moore gave a most instructive talk on the Moon and the Planets. The success of the meeting was largely due to the Museum Officials who gave us every facility, including the use of the Lecture Hall with its splendid projector.

E. H. NOON.

IMPORTANT CHANGES OF ADDRESS

Richard Baum, 3 Kings Crescent, East Boughton, Chester.
S. Bradford, 42 Marine Approach, South Shields.

FORTHCOMING EVENTS

1955
July 15-17th. Week-end Course in Astronomy at Wanfell College, Theydon Bois.
Sept. 27th. City Literary Institute Lecture Course commences.
30th. Morley College Lecture Course commences. “The Universe, the Explorers and their Methods.”
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