The ATLANTA ASTRONOMER'S REPORT

Vol. IV
No. 1
JAN.
1951

Officers of the Atlanta Astronomy Club

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THE ATLANTA ASTRONOMERS' REPORT is published monthly by the Atlanta Astronomy Club. Address Correspondence to J. H. Close, 225 Forkner Drive, Decatur, Ga.

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ENCKE'S COMET

-- by W. H. Pinson, Jr.

Encke's comet, one of the best known of the short period comets will make its forty-eighth observed appearance in the winter and spring skies of 1951. The accompanying ephemeris shows that it should be within fairly easy reach of amateur astronomers' telescopes and cameras during December, January and February, and again afterperihelion passage, in the morning skies of April and May.

Although Comet Encke is not remarkable in brightness, it has a number of interesting features which have made it of great interest to astronomers since its discovery. As a result of study of this comet in particular, Whipple has based much of his theory of the comet model.

In its very close approach to the sun, Encke's comet passes within the orbit of Mercury. Because of the relatively great mass of the planet, significant perturbations in the orbit of the comet occur, which enabled Backlund and other astronomers to make the most accurate determinations of the mass of Mercury.

The astronomers Mechain, Caroline Herschel, and Thulis observed this comet in 1786, 1795 and 1805. The comet is favorably situated for northern hemisphere observers every three periods. However, none of these astronomers recognized its periodicity. Again in 1818 it was rediscovered by Pons, who accurately recorded its position for seven weeks. From these observations, Encke computed its orbit and found its period to be 3-1/3 years. Encke's comet was the first after Halley's to be recognized as periodic.

Early observers of Encke's comet noted a marked and systematic change in the mean motion as it approached perihelion They attributed it to passage through a resisting medium. Backlund obtained scant but inconclusive evidence that the changes accompanied periods of excessive solar activity. The changes in motion have greatly diminished in recent years compated to the observations made in the early nineteenth century, but are still definite. The theory of a resisting medium near the sun is discounted because there is no other evidence supporting the existence of this medium and because other short period comets show no correlative behavior. However, Encke's comet is not the only comet to show changes in motion when nearing the sun. Comet Wolf 1 undergoes a decrease in mean motion and so also do Comet D'Arrest, Comet Brooks, Comet Halley, and a number of others.

Whipple has shown these perturbations in the orbit of Encke's comet to be caused by close approaches at aphelion (1 a. u.) to Jupiter. The period of Encke's comet is shown to be commensurable with the period of Jupiter, occuring every seventh revolution of the planet, except that occasionally the commensurability amounts to a half period, and a

four period separation occurs.

Whipple further points out that the orbits of the Taurids lie very close to the mean plane of the terrestrial planets, and differ from the plane of the orbit of Encke's comet by about 10 degrees-15 degrees. Other than this discrepancy, the orbits of the Taurids and of Encke's comet are very similar. Whipple accounts for the discrepancy by the perturbations caused by the periodic close aphelion approach of Encke's comet to Jupiter.

Whipple has shown that Encke's comet must originally have been quite massive to have persisted for so long as a short period comet. Astronomers (notably A.J.J. van Woerkom) believe that short period comets are replenished from the long period comets by capture by Jupiter. Such a view is necessary to account for the persistence of short period comets which are believed to be lost at the minimum rate of about three a century. The nucleus of Comet Encke is estimated by Whipple to be of a radius not greater than four kilometers, and probably does not exceed one kilometer.

Using the 60-inch Mt. Wilson reflector, Dr. Leland E. Cunningham spotted Encke's comet on plates taken in July and August, 1950. The photographic image was reported to be stellar-like and of a magnitude 19 to 20. On the basis of these observed magnitudes, Dr. Cunningham predicted magnitudes for succeeding dates through January 14, 1950, based on the fourth and sixth power laws. (Harvard College Observatory Announcement Card 1098) It is believed that the predicted magnitudes will prove too faint.

In predicting magnitudes for comets, the writer believes that the fourth and sixth power laws should not be employed until the comet is within approximately two astronomical units of the sun. As the comet nears the sun, it is heated, and evidently, (see Whipple in references) its material is vaporized when insulating layers of "ices" are destroyed. Consequently, it becomes more luminous, due not only to its approach to the sun, but to its activation.

In the ephemeris accompanying this article, the predicted magnitudes are based on, and extrapolated from, values given for Nov. 5 and Dec. 25, 1950, in the Handbook of the British Astronomical Association . These two values are probably based on past appearances of Encke's comet.

Encke's comet should be easily spotted in telescopes of moderate size during January and February, and again, following perihelion passage, in April and May. Many astronomers have independently "discovered" Encke's comet, using small telescopes and cameras.

References:

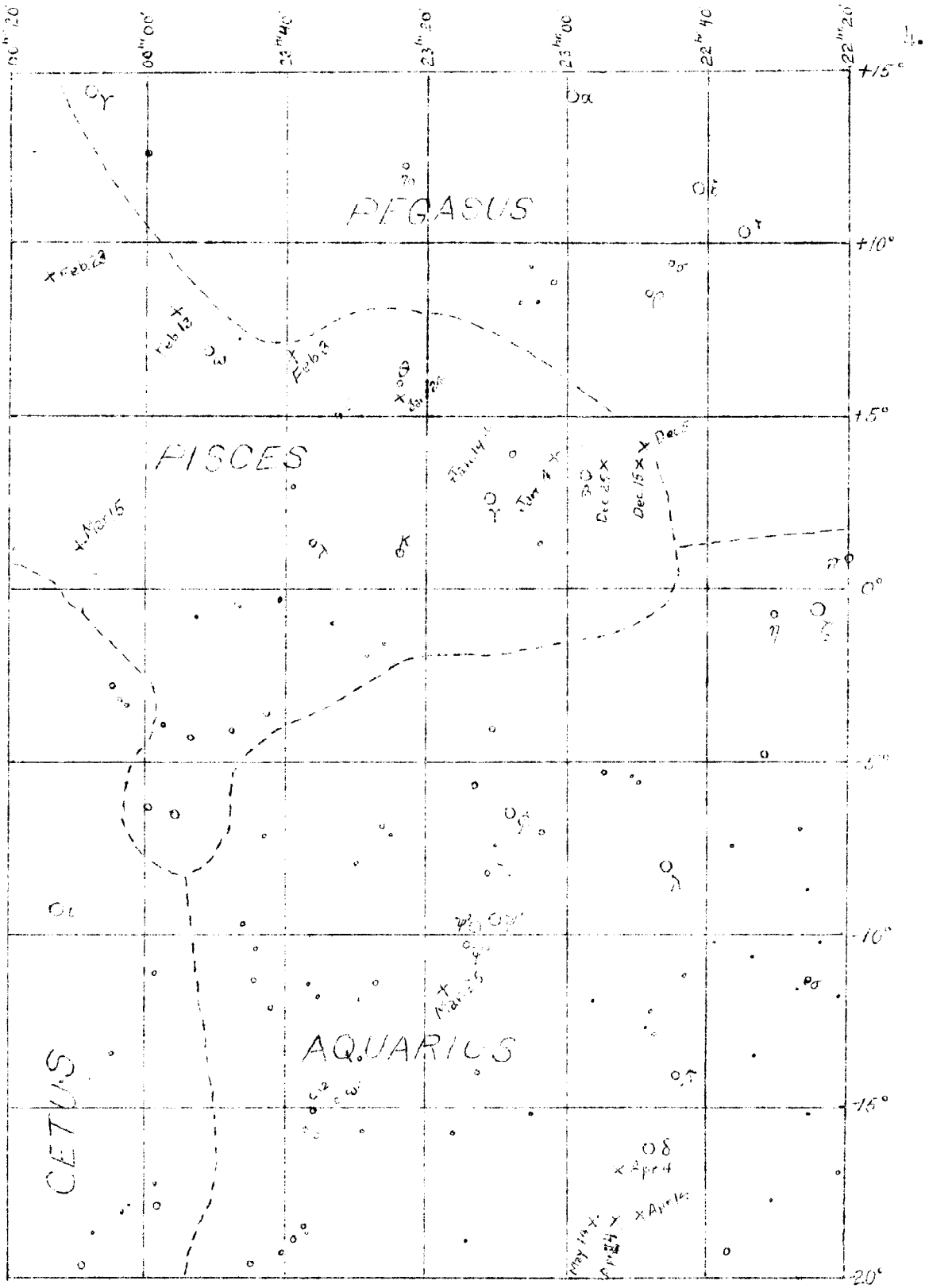
Whipple, F. L., Astrophysical Journal, Vol. 111, 1950

COMET ENCKE

Ephemeris by W.H. Pinson and T.C. Duke*

Date	R.A	Dec.	Perceived Magnitude	Distance from Earth Astron. Units	Distance from Sun	Apparent R.A. of Sun
Dec. 5, 1950	22hr 49.3	+4°04'	14.4	1.466	1.810	16hr 42'
Dec. 15	22hr 50.4	+3°40'		1.498	1.690	17hr 26'
Dec. 25	22hr 54.7	+3°·8'	13.8	1.516	1.563	18hr 10'
Jan. 4, 1951	23hr 02.1	+·3°2·'		1.517	1.429	18hr 57'
Jan 14	23hr 12.1	+4°37'	13.0	1.496	1.287	19hr 40'
Jan 24	23hr 24.6	+5°34'		1.450	1.136	20hr 23'
Feb 3	23hr 39.4	+6°44	11.5	1.373	0.9745	21hr 04
Feb. 13	23hr 56.2	+8°01'		1.260	0.8017	21hr 44'
Feb 23	00hr 14.2	+9°02'	8.9	1.103	0.6197	22hr 23'
Mar. 5	00hr 32.3	+08°26'		0.8938	0.4421	23hr 00'
Mar. 15	00hr 46.6	+01°10'	Perihelion	0.6831	0.3389	23hr 37'
Mar 25	23hr 13.1	-11°36'		0.6781	0.4175	00hr 14'
April 4	22hr 53.5	-16°52'	8.1	0.8058	0.5908	00hr 50'
April 14	22hr 49.7	-18°06'		0.9221	0.7738	01hr 27'
April 24	22hr 52.1	-18°15'	10.7	1.005	0.9481	02hr 04'
May 4	22hr 55.2	-18°14'		1.055	1.111	02hr 42'
May 14	22hr 57.0	-18°23'	11.7	1.081	1.264	03hr 21'
May 24	22hr 56.0	-18°49'		1.086	1.408	04hr 01'

*T.C. Duke is a teaching fellow in astronomy at Harvard.



Encke's Comet

Path, marked by X, shows positions in 1950 and 1951

[illegible], F. L., [illegible], Proc. Am. Philosophical Soc., Vol. 83, 1940

AN UNINTENTIONAL LEGACY

-- by John R. Peterson

It is only in the last few years that people generally have begun to accept science as something of real and currant value. Science had always been considered a not very practical pursuit -- one that might benefit future generations, but which provided no immediate benefit.

Moreover, there was a great deal of truth to the attitude. Newton's laws of motion, promulgated in the seventeenth century, were never completely utilized until the nineteenth century when they formed the basis for the mechanical age. Innumerable similar examples could be shown. Often basic discoveries have been made and forgotten because engineering had not yet advanced far enough to utilize the discoveries.

It is not surprising, therefore, that scientific research is one of man's newer pursuits. It had to wait until civilization had reached a point where man no longer had all he could do just to feed and clothe his family. After people learned to produce enough for themselves and still have a little left over, the services of some could be spared for other pursuits. However, such circumstances did not prevail for a long time after men first organized into their primitive societies.

Nevertheless, despite the extreme need in early times for full time production from every able-bodied man, woman and child, we find the non-productive pursuit of astronomy thrived where we should least expect to find it. The reason? Because, in the minds of the people it was not non-productive!

The earliest astronomers were the priests, whose sole function was so important that it required all their time. Their duty was to establish and maintain liaison with the gods. To explain how the priests accomplished this duty requires the use of a word which may be considered profane in an astronomical group. The word is ASTROLOGY.

As early as 2500 B.C. in the reign of Sargon of Akkad, the known stars had already been loosely grouped into constellations. And the motive which inspired this study was not the objective thirst for knowledge which characterizes today's scientist, but a very subjective one. The observer was attempting to determine the future through interpretation of the stars.

It is impossible to determine why man first decided that he could read his fate in the tracings of the planets. Perhaps it started with the very understandable awe which we all feel on an observing party. Probably every shepherd who ever lived felt sure as he lay down to sleep at night that the sky was the only suitable home for the gods. At first, each herdsman must have made his own constellations, but each would see different groups just as some of us see a teapot in the southern sky where the Greeks saw Sagittarius, the archer. Constellations would not have become "official" until the advent of the priesthood during the Temple Town era.

The priests had definite goals in view -- the interpretation of the will of the gods, forecasting the future and determining auspicious times to start projects. They had several tools for accomplishing this purpose, astrology being among the most important; and although we may doubt the value of their researches, we must nevertheless realize that from the point of view of the ancients the work had a very practical aspect. The interpretations of the sky determined all their actions, from the planting of crops to making war. It is this "practical" aspect that gave astronomy its early start; for in those days there was always the necessity for backbreaking labor every day to assure enough food for everyone. Every single person had to produce his share of goods for the community. Frivolous research into something that <u>might</u> help in the future was strictly taboo.

Thus, by supplying a definite need, astronomy became the first science. However, it did not become a very "scientific" science until the first millenium B.C. The Chaldeans, still with the same very practical end in view, really systematized the study.

For more than three hundred and sixty years they carefully and regularly recorded their observations. This is one hundred and sixty years <u>more</u> than the longest series of modern day observations which were begun in 1750 at Greenwich, England. This may explain in part how the Chaldeans managed without the aid of telescopes or <u>clocks</u> to calculate so accurately some of the solar and lunar motions. A Chaldean astronomer is reported to have calculated the time for annual sun-moon motions to t was <u>one second too long</u>. This calculation is even more impressive when we realize that his calculations must have been pure arithmetic without the help of electronic calculators or mathematical notation. This was undoubtedly an operation requiring remarkable patience and accuracy.

All these hundreds of years of careful observations, and their painstaking calculations are impressive enough when examined from our modern viewpoint alone; but when we take into consideration the purpose these people had

in undertaking this unceasing labor, we tend to marvel even more at their perseverance.

Why did they continue their fruitless task for thousands of years? It is not possible to say. Perhaps they received some encouragement. In a way, they did learn to predict the future. They learned to predict eclipses. Perhaps this encouraged them just enough. Perhaps they believed that if they worked harder, studied more, learned more about the heavens, eventually they could predict more. In fact, isn't that what motivates modern astronomers?

But, the most impressive thing of all about the astronomy of the ancient world is the idea of its utility or value. The earliest astronomers would have been unable to comprehend the idea of striving solely for the benefit of posterity. The benefit to be derived from effort had to be immediate. Consequently, they studied the motions of the stars in order to determine whether to plant today or next week; whether to go to war or make a treaty - things of immediate value, which we consider no value to him at all considering the source of his decisions. On the other hand posterity ultimately reaped the harvest of his endeavors. The astrologer-priest gave astronomy its start and carried it a long way, exceptionally long when we consider his equipment. The oldest science has stopped climbing for long periods during the last four thousand oddyears, but it has never had to start right back at the beginning again. There has always been a bank of knowledge ready upon which to start building again.

Furthermore, as more and more archaeological expeditions uncover ancient astronomical records, we find archaeology and astronomy complementing each other in dating events in pre-history and in verifying out calculations on the motions of the planets.

The priests of the ancient world fought bitterly against social change and consequently against the advance of science. But they also left us a priceless heritage of astronomical lore. Although the gift they gave us was unintentional, we owe them a great deal.

STARRING URANUS

The club is invited to stargaze from the Closes' home, 225 Forkner Drive, Decatur, from 8:30 p.m. till _____(closing time optional) on Saturday night, January 20. The planet Uranus is now in Gemini and of 6th magnitude, easily seen through small telescopes. The opportunity to observe it really should be taken advantage of, so mark your calendars now.

MIRROR REFLECTIONS

-- by Anna Belle Close

In the time that has passed since we last reported the completion of mirrors by club members, at least five have reached that state. Of these, as far as we know, Bill Simpson's is the only one which is silvered and mounted. Bill began his mirror while still in high school as a project for entry in the Westinghouse Science Talent Search, and we proudly announce that he won third place in the State of Georgia for his essay about making the 7-inch mirror. His prize money helped to pay for the telescope parts. It has a wooden tube, a first surface mirror for the diagonal and is mounted on 3-inch pipe fittings. Bill has been looking through his instrument since August. Congratulations, Bill.

Hugh Moore completed his 6-inch mirror in the spring, and though he has yet to have it silvered, he has drawn up the plans for the mounting which will be of the horseshoe type, mounted on a tripod which he is also going to make.

We have heard indirectly that Mr. and Mrs. R. F. Carter who were working on a mirror together have finished theirs, but our efforts to contact them have been without results. We hope to hear from them in detail about it soon.

The 16-inch which Bill Close struggled with for 17 months finally tested 98% correct in October. Bill is planning to have his mirror surfaced with the new Pancro coating which is done by a concern in California. Only slightly more expensive than aluminizing, this process, according to claims, permits cleaning of the surface of the mirror and has a higher reflective power.

Rob Maulsby's 6-inch received its last polishing stroke in the fall. He already has the base and is having his castings made for the mounting at the present writing.

Rob had started a mirror previously to this, but experienced the misfortune of its slipping from his hands and breaking. His wife Ann is now considering grinding a mirror too and may try to make a small disc out of the largest portion of the broken one.

Miss A. M. (Gip) Gippert and Mrs. Wheeler Winchester have also expressed an interest in making mirrors. If other feminine members of our group have been entertaining the idea of becoming active in the optical phase of astronomy, this certainly seems to be the time to join the new mirror grinding class which will be organized as soon as possible.

PLANET NOTES FOR FEBRUARY 1951

The Sun, during the month, moves from Capricornus into Aquarius and its declination changes from 17 degrees 23 minutes South, to 8 degrees 21 minutes South and the length of the day increases from 10 hours 23 minutes to 11 hours 25 minutes.

Mercury is a morning star, moving from Capricornus into Aquarius, but will be too close to the Sun all month to be seen.

Venus is an evening star, low in the western sky at sunset. It is moving rapidly eastward through Aquarius and Pisces, is in conjunction with the new moon on the 7th, overtakes and passes slow moving Jupiter on the 11th and moves on to pass Mars on the 15th. Also, on the evening of the 7th, Mars will be only 10 minutes to the north of Jupiter with Venus and the one day old moon about four degrees below. The group sets about 2 hours after the Sun. The three planets will be nearest each other on the 11th.

Mars moves from Aquarius into Pisces. It is now down to Magnitude 2 and not easily located in the evening twilight. It is in conjunction with Jupiter on the 7th, Mars 10 minutesto north, and with Venus on the 15th, Mars 35 minutes to north.

Jupiter is in Aquarius, quite low in the west at sunset and will soon be lost in the evening twilight, in conjunction with Mars on the 7th and Venus, on the 11th. Venus 26 minutes north.

Saturn is in Virgo in slow retrograde movement. It rises about 9 p.m. and is the only planet well placed for observation.

Uranus is in Gemini, about midway between the third magnitude stars Mu and Epsilon. Reaches the meredian about 9 p.m.

Neptune is in Virgo, some four degrees northwest of Spica. Rises about 10 p.m.

The moon is new at 2:54 a.m. on the 6th, full at 4:12 p.m. on the 21st. Nearest the Earth, 226,700 miles on the 3rd and farthest, 251,400 miles on the 15th.

by P. O. Parker

AN APPRECIATIVE NOTE

-- by C. H. Holton

In preparing the new membership cards, Mr. F. P. Rose has once again made a distinct contribution to the Atlanta Astronomy Club. He has previously printed and donated cards for notices of our meetings, and is planning to do so again. But in producing the certificates of membership for 1951, Mr. Rose has done an outstanding job.

One unusual feature is the attractive view of the Bradley Observatory showing in blue in the background. It was printed from an engraving of a photograph taken by Dorothy Calder and retouched by Bill Close.

After printing the background-picture on the cards, Mr. Rose set the type for and imprinted the statement which appears over it. The result is a distinctive certificate which our members will be proud to carry with them and glad to exhibit to their friends. It will not suffer loss of face when compared with cards of other organizations.

On behalf of the Club, I wish to assure Mrs. Calder, Mr. Rose and Mr. Close of our gratitude for this work which has involved the donation of materials, time and skill. We do appreciate the new cards, and believe that their attractiveness will add to the favorable reception of our Astronomy Club in this sector of the universe.

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Editor's Note: We sincerely wish to thank Mr. and Mrs. J. R. Peterson for cutting the stencils for the December issue of the Report. This is important work that has to be done for each edition, and we would be very grateful for volunteers.