OBSERVATIONS

XIII
Sun Spots Predicting Colder Weather Here For Next Four Years

Weather Cycle Is Closely Related To Turbulence On Old Sol

PROFESSOR EXPLAINS

It is expected that for the next four winters here will be colder, with more snow. This conclusion has been reached from the fact that for this period there will be more sun spots than there have been for the past eight years.

W. G. Colgrove, M.A., B.D., Chant Medalist of the Royal Astronomical Society of Canada, and instrument builder the Observatory of the University of Western Ontario, states that according to the sun spot cycle "we are in for cold winter weather". The reason for this change in conditions and disturbances of magnetic instruments, including radio, is that the ultra violet light sent out by the disturbances via the sun comes in contact with the surface of the earth and disturbs the lower atmosphere.

Butterfly Pattern

"When they appear on the sun at the beginning of a cycle they are found to be from 30 to 40 degrees above and below the sun's equator. Subsequent spots break out a little nearer to the equator both north and south until at the end of the cycle they have reached very close to the equator. If all the spots remained and did not fade out they would form a pattern on the sun in the form of a vast butterfly. Few spots are large enough to continue around the sun for a second appearance," Mr. Colgrove continued.

"The sun is made of the same material as the earth. It is our nearest star and none knows the cause of spots.

"Sun spots are evidently caused by chemical disturbance of the sun's surface gases. Occasionally this turbulence seems to have a centre which bursts out with enormous energy and sends out vast volumes of gases for hundreds of thousands of miles. Some is lost in space, the remainder returns to the sun. These explosions travel from 100 to 200 miles per second. The gas thrown off is mainly hydrogen gas. Practically all metals known on earth are in the form of gases on the sun," Mr. Colgrove asserted.

"These sun spots come and go in cycles with an average period of about 11 years. Today we are about three years up toward the peak with two years to go. Each month there will be an increase in the number of spots. These will run into the hundreds. For the four years following this there will be a decrease in the number down to none; that is none you can see through the telescope. The sun spots vary in size. Some have small openings approximately 100 miles across; others have vast caverns reaching 100,000 miles across the sun's surface.
Sun Spot Cycle Chart Reveals Colder Seasons, On The
THE SUN AND THE FLOODS

Editor, Free Press: Some months ago I wrote an article regarding the connection between the sun spots and the weather in which I pointed out that according to the records of the Smithsonian Institution at Washington, there would be about two or three years of heavier precipitation in the form of rain and snow. The first year has passed, and we have had the weather. I feel quite sure that most people who read the press are satisfied that that connection and the prediction or suggested inference was sufficiently correct to merit further study. Since many readers have asked me questions about it, I have prepared this brief explanation regarding the action of the sun as a possible cause of the recent floods.

In the first place let us all remember that the sun is a vast globe of various gases with an enormous central core where, in all probability, the atoms have been stripped of their electrons and condensed to a condition in which the mass is tremendously increased so that the sun's weight amounts to two octillion tons, written thus—2,000,000,000,000,000,000,000,000,000,000,000 tons.

Its surface temperature is about 10,000 degrees F., and its central heat is said to be in the order of 10,000,000,000,000 degrees F. It is light as measured in various ways, reaches the inconceivable amount of three octillion candle power, while its energy is calculated to be some five hundred sextillion horse power or 500,000,000,000,000,000,000,000,000,000 horse power.

It is any wonder that such an enormous, chemically turbulent, hot body would have any connection with our weather? I do not need to remind the reader that our world does not receive all of the light, heat and power, but only approximately one billionth of it, which, nevertheless, is great enough to cause far more damage if there were no atmosphere. You see it is one of the pretty ways of providence to make our planet habitable for folks like us. If our atmosphere, with its clouds, were removed, our race would immediately perish from the effects of extreme heat and ultra-violet light. It is in this atmosphere which is about six hundred miles high and of varying density, and weighing about six quadrillion tons, that the weather occurs.

In the second place, we must remember that the sun spots come and go in a period of about eleven years, that is, they increase from minimum, to maximum in about five years and then decrease to minimum again in about six years. At present, one year of maximum which has been tentatively set for January 1, 1948. Then the decline will begin, but the next two years of decrease will be much like the two years preceding the maximum.

The past year has been one of unusual intensity with respect to spots, at times more than a hundred have been seen at the observatory and almost twice as many at the great institutions. In November of last year the average reached 125 and just now there is a large group which we measured at 365,000 miles long by 30,000 miles broad.

This powerful concentrated outburst has reappeared twice already and seems strong enough to make a third appearance in about three weeks since it is carried round by the sun's rotation.

We have all noticed that the effect of the present maximum is spread over almost the whole of the Northern Hemisphere but these influences may be felt at any place on the earth, more especially on the land areas where rivers are not walled by nature or by man. The spots are more effective with respect to the earth at or near maximum because there are so many more to cross the centre of the sun's apparent disk, and that, for us, occurs mostly in the summer or the winter time.

The place of contact is, of course, determined by the rotation of the earth. Now it seems quite clear the present maximum with nearly 200 spots at one time on the sun some of which are exceptionally large, is probably the prime cause of the recent floods, because as stated in the former article, the sun's heat increases with the increase of spots and therefore causes more evaporation from the water bodies of the earth.

Happily this means more clouds to protect us and vegetation from the extra heat, but it also means more precipitation and possible flood conditions.

It is therefore reasonable to conclude that 1948 and 1949, will be much like the past year and the one preceding it. So now you can see why we had the flood ten years ago which was also at a maximum of spots and you may be quite sure that those in charge of conservation might do well to get ready for the next deluge about another decade hence, although it may not come our way nor be so widespread and severe.

W. G. C. COLGROVE,

P.S.: After this was prepared, I read an interesting article in the Saturday evening Free Press by Mr. Ruben Hornstein, M.A. M.B.E., one of Western's gold medalists, regarding the effect of Polar high pressure areas on our middle latitude weather.

According to Smithsonian records there are sixteen different causes for our weather, most of them quite insignificant yet necessarily included in any thorough scientific study and determination of the weather.

The sun, of course, is the cause of the rise and consequent fall of vast bodies of air which often take the form of wind whose speed may be that of a gentle zephyr or a destructive hurricane. It would seem therefore, that the sun is father of our weather, or at least, the most important agency in weather making.
Today at noon astronomers went star-gazing in Victoria Park. The above photograph shows Rev. W. G. Colgrove, president of the London centre of the Royal Astronomical Society, focusing a telescope on a sun spot. The telescopes were set up to view an unusual set of heavenly phenomena, including the planet Venus, just past the peak of its greatest brightness but visible at midday. A great crowd of spectators collected about the instruments and there were many oh's and ah's as sky secrets were disclosed. Astronomy has attracted a large number of Londoners in recent years.

Also on display were five groups of sunspots, ranging from 25,000 to 50,000 miles in width. An eight-inch image of the sun项目的on a sheet of paper, the spots looked not much larger than fly-specks.

To complete the heavenly play, August's new moon faintly visible in the eastern sky.
Dr. and Mrs. H. R. Kingston, the former, director of the departments of mathematics and astronomy and head of the Summer school of the University of Western Ontario, and Rev. and Mrs. W. G. Colgrove, also of London, at the gathering of astronomers meeting at David Dunlap Observatory. Mr. Colgrove's collection of instruments, entirely created during his spare time as an amateur, created much comment among the members of the society.
Tour of UWO Highlights Trip of Lucknow High School Students
Mrs. Thomas Sparks, of St. Marys, Donates Equipment

STUDIED EXHIBIT AT FAIR
Parts Assembled for Use by Rev. W. G. Colgrove

The mathematics and astronomy department of the University of Western Ontario is today the happy possessor of a new, six-inch reflecting telescope because an interested visitor at the university's Western Fair exhibit this fall stopped and chatted with Rev. W. G. Colgrove.

The donor, Mrs. Thomas Sparks, of St. Marys, was interested in the display of astronomical apparatus in the mathematics department's exhibit, where Mr. Colgrove lectured daily on celestial phenomena. In a conversation with the lecturer, Mrs. Sparks recalled that her late husband had also been an ardent amateur astronomer and in her home now discarded, were the requisite parts of a reflecting telescope. On learning that the university had but meagre astronomical equipment, and could well use more, Mrs. Sparks generously offered to donate the telescope to Western.

Mr. Colgrove drove to St. Marys the first opportunity and picked up the old telescope. The lenses and mirrors were covered with the accumulated dust of nearly 20 years, but still fundamentally good. Several weeks work of polishing, cleaning and realigning were required to make the telescope usable again. Mr. Colgrove assembled the parts, remounted them in a barrel-like iron framework set on sturdy iron base and this week formally turned the telescope over to the university.

Dr. H. R. Kingston, professor of mathematics and astronomy at Western, was highly pleased with Mrs. Sparks' gift and Mr. Colgrove's painstaking workmanship. He told The Free Press the telescope would be a very welcome addition to his department's equipment, invaluable for demonstration purposes. Good instruments, he added, are extremely high-priced and usually beyond his department's budget, and such gifts as these are, for that reason, all the more appreciated.
Huge 1,500-Foot Tube Seen As Lunar Rocket

Before radar reached out and probed the moon, the following article by Rev. W. G. Colgrove, Christie street, might have been judged too fanciful to warrant publication. Now, however, it is at least provides material for interesting conjecture, visualizing it does the day when we will actually reach the moon by jet or rocket-propelled space ship. This article is the second in a series, the first of which, appearing in The Free Press yesterday, quoted Col. H. N. Butler, U.S. Army scientist, as authority for the contention that a trip to the moon is feasible.

BY REV. W. G. COLGROVE

THE recent radar experiment with the moon as target about 240,000 miles away has revived in the minds of some people the problem of space-flight travel and has brought to our attention the fact that it is a popular subject among the boys and girls of the rising generation. Since that experiment, almost every group of visitors to the observatory has asked about the possibility of such an undertaking, and we have made a variety of suggestions as to how it might be attempted, but have always stressed the improbability of surmounting the many difficulties and risks involved in such a hazardous and costly flight.

In the first place, it should be remembered that the accurate planning of such a trip would require months, even years, of most careful research and investigation before even beginning the task of drafting the plans. It would be necessary to employ a half dozen space ship designers and engineers together with an equal number of deep-aeronautical experts with much mechanical, mathematical and scientific knowledge. For their convenience it would be necessary to build and equip a modern mechanized laboratory in which all parts could be designed and tested. Beside this, there would have to be a giant hangar capable of housing the completed ship and its cargo for the voyage, including such items as oxygen, oil, fuel, water, food, etc.

In the second place it would be necessary to organize a strong group of financiers and scientists to sponsor the effort, to formulate the program and make the necessary arrangements. This group would decide the size of the craft, including all necessary space for equipment and personnel. We suggest the ship take the form of a reinforced doubly-braced tube about 10,000 feet long and 30 feet in cross section with a large double-cased transparent cone at one end and a slowly tapered body with a pair of fixed wings on top every 200 feet and in between each pair an extra pair of emergency wings folded back during flight.

It would be wise to build two smaller ships, one to investigate meteorological conditions in the limits of earth's atmosphere, and the other to venture 1,000 miles above it to actually test the value of wings, jets, rockets and space currents, if any. A total load of 10,000 tons would be possible with the large ship, only half loaded, to prove its space-worthiness and the feasibility of further exploration. If these three "feeler flights" were successful, we would be encouraged to attempt the vast plunge to the moon itself.

In the third place, the committee in charge would have to call for at least 100 volunteers from whom they would choose the 25 or 30 best qualified men and their assistants and supply each with two masks and two individual supplies of oxygen to be worn every minute of the 50-day trip.

The personnel would include a chief engineer, four pilots, an engineer, a navigator, two mechanics, an orderlies, a meteorologist, a biologist, a photographer, a radio operator, a reporter, a carpenter, a plumber and chef.

Of course, the Insurance companies would immediately cancel all present protection and the insurance committee would have to arrange time and safety for whatever dependents were left behind. It would be the task of everyone in the committee to see that all the personnel and material equipment for the complete outfitting of the ship which we suggest should have been rocket jet propulsion.

In the fourth place, the scientific groups would have to engage in plotting the direction of our course so as to reach the moon at a specified point in its orbit, say or near apogee where its speed, whose average is 2,288 miles per hour, is only about 1,500 miles per hour. This indicates that the ship must be capable of taking a landing to ensure a safe landing.

Such high speed would be necessary during the trip except to escape the possible impact of an occasional meteor that might cross our path. A speed of 500 miles per hour would be sufficient and would take us to the moon in 20 days. We would stay 10 days and would arrive at home again after 50 days. It is interesting to note that we would always be in sunlight if we kept away from the earth shadow.

In the fifth place the committee would have to see to it that the designers arranged for comfortable bunks, lounges, books, magazines and games as well as a well-stocked kitchen full of fresh and prepared foods so that the chef could make about 5,000 meals.

Then the supply of clothing would have to suit the extremes of temperature during the trip and to the moon. Of course the ship itself would possess a modern system of temperature control but when men leave it to work on the moon's surface they will need electric hoods and overcoats for areas beyond the tent, as well as shorts and umbrellas to prevent sunstroke in areas under the sun.

Heavy iron-clad boots will be necessary on the moon's rough surface. Large bins, erected for various stores on the outward journey, will be gradually emptied but will not remain so very long, for the geologists, on arrival will fill them with tons of lunarological specimens and meteorites.

To see what there is on the other side of the mountain range or hundreds of feet below in the yawning sea of space where the world is only about 1,000 miles from the earth, it will be necessary to have board a jet-propelled helicopter, as well as a fleet of large sections of the moon's body, make a jet-propelled jeep. It would not be very difficult because the density of the moon is only 3-5 of the earth's and the gravity only 1-6 of our own. Astronomical instruments have a prominent place of honor for the sky will make the brilliant points while we are looking at the moon and our planet earth would be a ring system of which to announce our arrival and the shadows of the searchlights would be beyond the terminator or horizon of our moon.

In the sixth place, for our visits to the moon port with its precooler would be made en route of the peculiar manner of the atmosphere and the fact that the moon's no atmosphere and a Watson's attraction as a high speed. We will be lighter and have to start up slowly and much more carefully.

To insure safe landing we would have to increase the speed to 10,000 miles per hour, they keep close to the moon to watch for a spot in days when the sun and the moon are at 800 miles from the terminator where the temperature would be about 70 fahrenheit. This precaution would be necessary because the atmosphere is a sun's ray. From the sunward during its two nighttime it increases degrees fahrenheit below.

It would be interesting to cut our activities at length but I think your attention may be as good as so I will close this curiously by reminding you that the tons of moon material to create 600 tons as we have again on earth. But how will we come alongside of it as we do the moon for it would pass little off from a super.

Well, then, that shall:

Why didn't we think of our rocketed everything? Why didn't we think of it before we started? What makes the crazy venture a toy of wishful thinking?

Our fuel is getting low to land somehow, so go for a head-on attack. The ship round turned and landed in the air, and land on the moon for it would pass like a shot from a super.

Good-bye folks! We've out of this for truth.

Let your imagination paint the tragic scene—a superman with a sun's side on it, a magnificent body the sun's side of a sun's side scattered wide upon the earth and light, the moon, the earth and our planets, all as we know them. It all comes of us and piece of the moon at our home.
Elected Head of Local Astronomical Society

Reports of Successful Year Presented to Members

Unselfishness is a traditional virtue of your true student of astronomy, it was stressed last night by Rev. W. G. Colgrove, of the botanical department of the University of Western Ontario.

Mr. Colgrove spoke briefly after his elevation to the presidency of the London Centre of the Royal Astronomical Society of Canada. The men and women of the district who devote much time throughout the year to a study of the great cosmic mysteries of the universe, met in the Normal School for their annual business session.

President-elect Colgrove added: This band of men and women is rather unusual in that it follows the path of the true astronomer, attaining the high mark of unselfishness; a total unselfishness in regard to his knowledge, his helpfulness and his fellowship.

OTHER OFFICERS

Other officers chosen last night for 1939 were: T. C. Benson, vice-president; Dr. G. R. Magee, secretary-treasurer, and the following councilors, Omar Kilbourn, St. Thomas; Miss S. Livingstone, Westminster Hospital and W. L. Scandrett, John Middlebrook and Don M. Hennigar, of London. Professor H. R. Kingston is honorary president, John C. Higgins is retiring president and Major Harold Anundson was named as representative to the central provincial committee.

The annual report, which recorded a most successful year for the local branch, was read and adopted. Many edifying lectures were given during the twelve month and outside observations of stars, comets and other interesting phenomena were held.

It was reported the society may have to meet next year in either Normal School or Technical School as former quarters may not be available. There was a more humorous suggestion that space in the new library will be available in due course.

As last night was the windup session for the term, technical subjects were avoided and refreshments were served after the business sitting.

Let Us Have a Proper Symbol for Pluto

(Letter to the Editor)

Not long ago I received a letter from a prominent astronomer in the United States in which he said he was the author of the present symbol for Pluto, and that it was acceptable to the Lowell Observatory.

One may remark on some of the carelessly conceived symbols we already have, e.g., that for Leo, which is much like the one for the ascending node; those for Virgo and Scorpio, neither of which is truly symbolic; the curious combination of the symbols of the sun and Mars to take the place of Herschel’s H for Uranus, and now the return to the “initial” method for Pluto. Percival Lowell called it X, let it be completed in a scientific way. Some persons thought the present symbol was a temporary suggestion awaiting a more carefully devised creation; and surely it should not remain if we can find something truly symbolic.

The change suggested is to keep the X and simply surround it with a circle. Letters are not scientific symbols except in algebra and chemistry and never find monograms so used. The X has always stood for the unknown and the circle may properly be added to indicate that astronomers now surrounded this planet and included it in the solar family as within the circle of their ever-expanding knowledge.

I submit the truly symbolic symbol of a multiplication sign w. in a circle, for the earth?

London, Ont.

W. G. COLGROVE.
Modern Science Proves Signs of the Star of Bethlehem

Modern astronomical science has confirmed the Biblical story of the Star of Bethlehem which shone over Christ's birthplace 1,900 years ago and has even assigned a name to the celestial phenomenon which appeared on that first Christmas Day. Today Rev. W. G. Colgrove, M.A., D.D., retired London clergyman and amateur astronomer, told The Free Press of the sources, background and history of this confirmation.

In the very earliest times the order of the 12 Zodiacal signs began with Leo and concluded with Aries, just as the Gospel begins with the Virgin and her child and ends with the final triumph of the Lion of the Tribe of Judah. The constellation of Virgo, with its related groups of Coma, Centaurus and Hercules, occupied as that which symbolizes motherhood and birth of Christ.

Turning to modern astronomy, Mr. Colgrove pointed out that present-day findings concur with this belief. At midnight at the Vernal equinox in March, nine months before Jesus was born, the sign of Virgo was on the meridian of Bethlehem, indicating the announcement to Mary. At midnight at the winter solstice in the following December, this same sign was rising, and precisely at the same time a new star appeared in Coma and stood apparently over Bethlehem at that time. It was not specially created, but it did herald the first Christmas and its Christ-child.

LARGEST PLANETS

Besides these unusual events, the annals of astronomy show that during the year prior to the birth of Jesus there were three conjunctions of the two largest planets, Jupiter and Saturn, which occur in the same constellation only once in 800 years. While this was being watched, a third planet, Mars, arrived to add its glory to the scene and thus provide a rare, triple conjunction. Still more remarkable, these conjunctions occurred in Pisces, the zodiacal sign of the fishes, which in all ancient traditions of sacred and profane history, and the precise and penetrating rays of ancient and modern astrology all focused on this most marvelous and romantic revelation of God—a Nova and a triple conjunction of the most important planets as heralds of the birth of Christ.

In the early days, Mr. Colgrove said, the peoples of Eastern countries studied the stars, and the Jews had always expected their Star of Bethlehem which shone over Christ's birthplace 1,900 years ago and has even assigned a name to the celestial phenomenon which appeared on that first Christmas Day. Today Rev. W. G. Colgrove, M.A., D.D., retired London clergyman and amateur astronomer, told The Free Press of the sources, background and history of this confirmation.

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Local astronomers last night had a view of the Perseid meteor and the Finster comet from a vantage point in front of the Arts building of the University of Western Ontario. However, the view of the meteor and comet was not altogether satisfactory, as a haze obscured the view for the greater part of the evening. Both would be easily visible now if the sky was clear. The above photos were taken at the university by a Free Press cameraman.

Top—A general view showing a group of spectators gathered around Rev. William G. Colgrove and his four-inch refracting telescope. John Middlebrook, a member of the London Astronomical Society, who was in charge of the arrangements for the observation of the meteor, is at the right, and Dr. H. R. Kingston, of the Western faculty, second from the right. Bottom left—Several members of the London Camera Club had their cameras trained on the skies with the hope of photographically recording the event. F. H. Coates, president of the club, is at the left, and A. E. Adams, club treasurer, at the right, in the photograph. Bottom right—Rev. W. G. Colgrove as he pointed in the general direction of the meteor to Roy C. Cassie and his daughter, Velma Cassie, of Fort Erie, as the skies cleared briefly revealing the meteor and comet. Mr. Cassie is principal of a Fort Erie public school and is attending summer school at the University of Western Ontario.
The third and largest instrument to come in for observation was the planetarium. Persons who saw the huge planetarium at the Chicago Century of Progress would see something different again in looking at Mr. Colgrove’s creation. The one at the World’s Fair, however, might more accurately be classed as “star theatre,” it is declared. The one designed by the Londoner is a simple planetarium illustrating motions, configurations, relations and positions of all the planets and the more important moons. It is in fact a miniature of the entire solar system. What Mr. Colgrove had to begin with on this was an electric lamp placed in the centre to represent the sun; a number of “planets” long strands of wire, graduated circles. The whole thing is mounted on a pedestal.

He has made, too, a large star chart which demonstrates the helical paths of the planets as they ride around and with the sun in its flight of something like 400,000,000 miles a year. Over in one corner of the group stood a blue and white colored cardboard which, at first glance, looked like an example of modern art, ultra modernized many degrees. What it really turned out to be, however, was a model of our galaxy or universe, built to scale, and embracing every star we see. It has the form of a spiral nebula in which the position of the earth has been worked out by its designer to show exactly where we are situated among the stars. Persons anxious to find “their place in the sun” are recommended to see this.

He has invented about 20 astronomical aids to teaching. Most of the equipment including planetariums at University of Western Ontario has been designed and built by Rev. Mr. Colgrove. He has also supplied equipment for the University of Saskatchewan.

Prof. Kingston of ‘U’ Likes Astronomical Set

Prof. H. R. Kingston, astronomer of the University of Western Ontario, said to-day he thought so much of the series of astronomical instruments made by Rev. W. G. Colgrove as an “amateur” that he had decided to buy several of them for the university.

“They are better than I can get anywhere else,” said Prof. Kingston. “I don’t know where I could get a planetarium as good as this.”

Mr. Colgrove made a series of about 38 instruments, using pieces of stovepipe, parts of egg beaters, sheet iron and a good deal of wood and wire.

Aids to Teaching Astronomy Invented

The facile fingers of Rev. W. G. Colgrove, lecturer in astronomy at the University of Western Ontario, are in demand than ever. He has invented about 20 astronomical aids to teaching.

The display also includes a spectroscope, the weapon whereby the astronomer investigates the composition of heavenly bodies by the light they give off.

A tellurium, made with the cogs of a household egg beater, shows the earth and sun maintaining their various relationships throughout the seasons.

Shows Relationships

The constellarium shows the relationships of the stars in groups. In the display are two telescopes. One is a four inch refractor, that is one which bends the rays of light by passing them through lenses. The other is a small reflector for demonstration purposes; its reflection is a cheap magnifying shaving mirror.

Mr. Colgrove built the instruments in his own small workshop. He has in addition written a number of astronomical lectures in connection with the University of Western Ontario extension work.
REV. W. G. COLGROVE, M. A., of 2 Christie street, London, has thrown open an invitation to anyone interested, to come to his home to view Peltier's comet. While the comet is now leaving the sun it will be visible for about a week. When the comet will return is not known, or it may never return. Jupiter has attracted and held 30 comets which revolve about it at regular intervals and Peltier's comet may likewise be attracted. Mr. Colgrove is shown with his telescope at the rear of his home. Mr. Colgrove is a member of the Royal Astronomical Society and author of the book, "The Solar System." (Staff Photograph.)
EXPLAINS WORKS OF SOTELLUNIUM

Most Recent Invention of Rev. W. G. Colgrove

WILL IMPROVE CHARTS

Demonstrates Position of Sun, Moon, Earth Any Time

Rev. W. G. Colgrove, retired clergyman and noted amateur astronomer, gave The Free Press a preview today of his most recent invention, the Sotellunium.

Rev. Mr. Colgrove explained the name was derived from the three Latin words for sun, earth and moon. Like most inventions, this one was mothered by necessity.

"There has always been a need for some mechanical device which would show the position of these bodies in their true relation to each other at all times of the year," said Mr. Colgrove.

Until the London astronomer perfected this Sotellunium, astronomical demonstrations have been limited to one-dimensional charts. With Rev. Mr. Colgrove's working model, the true position of the moon, sun and earth can be demonstrated for any time of year, it is claimed.

The Sotellunium performs four principal functions, according to the inventor. It shows the revolution of the earth around the sun, the rotation of the earth on its own axis, the revolution of the moon around the sun in its true elliptical orbit (the first time this has been shown mechanically), and gives, in one complete swing on the handle, a full yearly record of the relative position of the three bodies. The earth is offset so that, no matter what the position of the Sotellunium, the polar axis always points north.

HOW THE MOON REVOLVES AROUND THE EARTH

Probably the first educational instrument devised to aid in astronomical teaching of the correct relation of the moon as it revolves about the earth while both planets are circling the sun has been announced by Rev. W. G. Colgrove, lecturer in astronomy at the University of Western Ontario. The instrument is called a "Sotellunium," and Rev. Colgrove shown checking the instrument for the demonstration of a lunar eclipse. The lamp at the left represents the sun, while the moon revolves about the earth at the right on its elliptical orbit. Many students have become "star" conscious the past few years.

Under both the earth and the sun are two graduated circles, over which pointers travel when the device is set in motion. That under the sun shows the monthly position of the earth; the indicator under the earth shows the direction of other planets and the constellations in which they can be found.

The true orbit of the moon is shown, to demonstrate that many times in its orbit the moon cannot eclipse the sun or be eclipsed by the earth. Rev. Mr. Colgrove pointed out that his is the first model to show why this is so. In addition to the orbit of the moon, this satellite can be seen in all its monthly phases by means of the beam from the "sun" at the opposite end of the Sotellunium. This 100-watt sun is bound around with a wire equator to show why sunspots are more prevalent in summer and winter than in other seasons of the year.

The inventor said there were many more uses to which the Sotellunium can be put. He has presented it to the university's astronomical department and it will be shown at their display at the Western Fair. The Sotellunium is Rev. Mr. Colgrove's 12th invention along this line, and he spent about nine months on it with the aid of university technicians. He hopes it will be copied by other schools and universities, and while he could not estimate the cost, said it would be well within the reach of any institution.

Dr. H. R. Kingston, head of the university's astronomical department, said "it is the best instrumental aid I have ever seen for the demonstration of difficult astronomical problems."
As City Saw Eclipse of Sun

I, the sun being partially eclipsed by the moon is seen here by Rev. W. G. Colgrove, public lecturer of the Mayn Memorial Observatory (pointing, at right). The large image is the sun's image thrown on the white screen by the telescope of the University of Western Ontario. At the top right image of the moon photographed soon after it began to move across the sun's surface. Below the moon, and nearly in the centre of the sun, are a series of sun spots, estimated to extend over 100,000 miles of solar surface. The eclipse was seen over a wide area of the continent. Students, left to right, are: Jack Labatt, Stan Kostashuk, Bob Snyder and Bill Johnston. (Free Press Photo.)

London Gets Good View Of Noon-Day Eclipse; Seen Over Canada, U.S.

Londoners with smoked glasses were afforded a good view of the slightly more than 50 per cent eclipse of the sun which occurred between 10.40 a.m. and 1.42 p.m. today. Only slight haze drifted across the face of the sun during the celestial show.

The eclipse was visible in varying degrees in all parts of Canada and all but the southeastern corner of the United States. In Greenland it was expected to reach 78 per cent totality.

Though of slight scientific importance, and lacking the popular attributes of the total eclipse, such as the roosting of birds and cows coming home from pastures, the event was watched by scientists and astronomers with interest.

The weather was not promising during the early morning, as falling snow made it impossible to open the telescope at the University of Western Ontario observatory in time to catch the first rim of the moon sliding over the sun's sphere at 10.40. As it in answer to the wishes of the astronomers, the snow stopped at 10.45, and five minutes later the observatory sun roof was swung open. The long tube of the 10-inch refracting telescope probed upward in search of the sun, throwing its image onto a large white screen in the observatory.

The moon's slightly jagged rim was seen to be already well over the round pale sphere of the sun which was magnified to 40-inch diameter on the screen. Also revealed were a series of large sun spots almost in the centre of the sun and of perhaps 100,000 miles extent—on the sun's surface—which will probably adversely affect terrestrial radio communications.

University students watched the progress of the eclipse, following closely explanations given by public lecturer in charge of the observatory, Rev. W. G. Colgrove.

The moon's black image covered the entire upper half of the sun, yet did not appear to make any appreciable difference to the light falling on the earth.

The eclipse followed its expected course very exactly, reaching its fullest extent at shortly after 12 and ending about 1.42.
Astronomy Puzzle

Pluto -- New Planet in the Sky

By W. G. Colgrove, M.A., B.D., U.W.O.

DISCOVERY—For many years astronomers were puzzled by the unusual way that Uranus, the seventh planet, was perturbed in its plotted path and in 1846 they discovered the cause in a new, more distant planet, now called Neptune, but later, when Uranus had passed from the range of Neptune's influence, it was found that Uranus continued to act in a similar fashion but with much less variation.

This caused astronomers to suggest that there might be another planet, more distant than Neptune, whose gravitational pull was sufficient to account for these lesser perturbations of Uranus. Among those who became most interested in the matter was Dr. Percival Lowell, a wealthy New England mathematician and astronomer who, in 1894, founded the now famous Lowell Observatory at Flagstaff, Arizona, for the special study of the planets. After years of painstaking and lengthy calculations he felt that he had determined the path in the sky where the suggested body might be found, but it was not immediately discovered so he directed some members of his staff to undertake an intensive photographic search along the ecliptic near the proposed location.

This was carried on for several years and finally resulted in tracking down the elusive planet near the star Delta (Wesat) of the constellation Gemini in January of 1930 but it was not announced until the following March. The astronomical world, of course, stood on tip-toe to welcome this new member of the Solar System and to suggest a name for what had been designated only as X.

NAME—After much discussion and correspondence with professional astronomers the name Pluto was suggested by a child in England and at once was adopted. This was very fitting because that was the name of the ancient mythical god of the underworld of darkness and must not be confused with Pluto the god of wealth, nor with Pluto, the dog. It is rather significant that its first two letters are the initials of Percival Lowell and may I add another interesting feature: Pluto stands for—Percival Lowell Unusual Telescopic Observer.

The best known myth about Pluto is the one which tells of his being seized on the earth's surface in search of a wife, and how he seized Proserpina, the beautiful daughter of Ceres and bore her away to Tartarus as his queen.

SYMBOL—The X it had before it was discovered was merely an algebraic letter and properly indicated it as an unknown quantity, yet it might have become a part of a real symbol if those in charge had simply put a circle around it to show that it was now within the family of the solar system. This, however, was not done and instead we had forced upon us a non-symbolic diagram B, the initials of Percival Lowell, to which he would never have agreed if he had been alive. The precedent which was established in respect to Herschel and his planet Uranus was pushed rudely aside but we hope it will be restored as time passes and we shall have a proper symbol for this ninth planet.

DIMENSIONS — Without explaining the method of determining its diameter we shall just state the latest estimate is that it is about the same size as the planet Venus, say 7,500 miles. Its density seems too much the same but its temperature is said to be in the neighborhood of 400 degrees below zero F. We do not know its period of rotation as yet and must wait for the 200 inch Hale telescope may tell us.

DISTANCE—Again without explaining the method of calculating its distance we simply say that the latest figure for its mean distance is close to 3,700,000,000 miles or about 40 times the distance of the earth from the sun. The sun's appearance from there will be similar to our view of Sirius but not so brilliant since the sun is yellowish in color. The amount of sunlight received is only 1-1,600 of what we receive per unit area. This, of course, accounts for its frigid condition. It cannot be seen without powerful telescopic aid.

THE ORBITAL PATH — The planets cannot have orbits in the form of closed plane ellipses (which is what the sun is moving through space at 12.6 miles per second and is carrying the planets with it so that their paths of revolution are helical in shape. Pluto's path is an extremely elongated ellipse which requires 248 years for its completion and since it is keeping abreast with the sun it must travel as far as does the sun in those 248 years which amounts to about 98,500,000,000 miles. To this we must add the extra distance Pluto travels in revolving around the sun. The geometry of the cylinder shows that we must add about 2,800,000,000 miles so that Pluto's total distance covered in one revolution amounts to about 101,400,000,000 miles instead of the 23,250,000,000 as given for its plane orbit.

To accomplish this Pluto must travel at 12.8 miles per second which is over four times the 3 miles per second given for the plane orbit and when we consider the distance we find that it also is over four times as great. It looks as if other planets outside Pluto cannot exist because Pluto is traveling only 1.5 of a mile per second faster than is the sun and if a planet were traveling that much slower it would be moving at the same rate as the sun and could not revolve around it.

NEPTUNE'S relation to Pluto — In our remarks above we have discussed the effect of the sun and Uranus on Pluto. We shall now say a few words about the unusual relation of Neptune to Pluto. In 1946 Neptune crossed the path of Pluto, something no other planet can do to any other planet, but at the point of crossing there was no collision because Neptune was over 200,000,000 miles outside Pluto's path. Neptune is proceeding on its way to its aphelion point which is its farthest position from the sun and, strange to say, the perihelion point of Pluto's path is very close to the same place so that Neptune, in 1993, will be about 100,000,000 miles outside Pluto's path. In another 43 years Neptune will encounter Pluto's path and be again inside without having encountered Pluto on the way.