ASTRONOMER TELLS ABOUT SPOTS ON SUN

DR. H. H. PLASKETT OF VICTORIA WRITES INTERESTINGLY OF SUBJECT HE HAS STUDIED

(From Victoria Colonist)

A recent notice in the daily papers has drawn attention to a group of spots on the sun sufficiently large to be observed without a telescope. In order to see such spots, and at the same time protect the eyes from the intense light, it is necessary to look at the sun through a piece of dark glass. The sun-spot will then be seen as an apparently minute black speck, though it is well known that to be so visible to the unaided eye such a spot must have a diameter of at least 27,000 miles, sufficiently large to hold some ten bodies of the same size as our earth. In view of the fact that spots as large as these will not infrequently be seen on the sun during the next few months, it has occurred to me that the subject of sun-spots would form a timely topic for our astronomical discussion. My remarks will be divided into two parts: Firstly, on the nature of sun-spots and their relation to the sun, and secondly, the relation between sun-spots and phenomena on the earth, such as magnetic storms, radio reception and the weather.

NATURE OF SUN-SPOTS

Spots on the sun were first discovered in 1610 by the Italian scientist, Galileo—a discovery which first excited much speculation, later to be followed by incredulity. To the learned men of Galileo's day, with minds steeped almost unconsciously in classical mythology and philosophy, it seemed incredible that the sun could have spots or blemishes on its surface. Many refused to believe in the existence of spots, their own eyes to the contrary, and those who did accept Galileo's observations were inclined to attribute the spots to small bodies moving between us and the sun. Galileo's subsequent observations, which were so extended as probably to hasten blindness in his later life, established that these spots were actually on the surface of the sun and carried around by its rotation in a period of some twenty-seven days.

HEINRICH SCHWABE

Following Galileo, a period of nearly two hundred years elapsed before any substantial addition was made to our knowledge of sun-spots. In 1827 there lived in the town of Dessau, Germany, a druggist by the name of Heinrich Schwabe. Filled with a burning passion for astronomical observation, he resolved to observe the sun daily with a small telescope in the hope of discovering, silhouetted on its surface, a new planet revolving between us and the sun. For twenty-five years, weather and health permitting, there was not a day that "his imperturable telescope" did not record the number and position of the spots visible on the surface. Many years afterwards he likened himself to Saul, who, in search of his father's asses, gained a kingdom, for though Schwabe found no planets, he did make a most remarkable discovery. He found that the number of spots visible on the surface varied from year to year, and that approximately once in eleven years the number reached a pronounced maximum. Subsequent observation has fully confirmed Schwabe's discovery of an eleven-year period in the number of sun-spots, and the present large number of spots visible on the surface of the sun is in accord with Schwabe's predicted sun-spot maximum in 1926.

WHAT ARE SUN-SPOTS?

Interestng though these early discoveries of Galileo and Schwabe are, yet they do not give us much clue as to the true nature of sun-spots. Are they mountain peaks projecting through the solar atmosphere are they dark clouds floating on its surface, or do they represent the outward sign of some depeseated disturbance in the sun? At one time or another astronomers have accepted one or other of these three hypotheses, but in the light of modern investigations we are now convinced that only the last theory can be correct — namely, that sun-spots are the most obvious sign of deep internal disturbances in the sun. From exceedingly simple observations on the amount of heat given by the sun to the earth, we know the temperature of the sun to be 10,000 degrees F. Further, from measures of the darkening at the edge of the sun, easily visible to the unaided eye through a piece of dark glass, we know that the temperature rapidly increases as we go inwards to a predicted central temperature measured in millions of degrees. At such high temperatures all known elements would be completely vaporized, so that the hypothesis that the sun-spots are due to solid mountain peaks or clouds of liquid particles are clearly ruled out of court. Further, the work of Fowler, at London, Hale and St. John at Mount Wilson, have shown the sun-spots to be low-temperature, rapidly rotating cyclonic disturbances, drifting across the sun at slightly different rates. Also Dobson at Oxford and Pettit at Mount Wilson have shown that during the period of sun-spot maximum the amount of ultra-violet light received from the sun is almost double that normally received—showing that these cyclonic sun-spots are probably only one of a number of events arising out of some unique pre-determining cause. The general picture, then, of sun-spots being one of the more obvious results of deep-seated disturbances in the sun is probably correct; but as to the actual nature of those deep-seated disturbances we are as much in the dark as Galileo was with regard to the nature of the spots themselves.

TERRESTRIAL PHENOMENA

We must now pass on to the second and final part of our discussion— the relation between sun-spots and phenomena observed on the earth. In order of decreasing probability we may note three possible inter-connections, firstly a relation between the number of spots on the sun and magnetic disturbances on the earth; secondly, not quite so certainly, a connection between sun-spots and radio reception; and thirdly, very problematically, a relation between sun-spots and the weather. Let us consider briefly the evidence for each of these relationships, and then try to determine the mechanism by which the appearance of spots on the sun produces these effects on the earth.

The inter-connection between sun-spots and magnetic storms is the relation most clearly established. It was discovered some seventy-five years ago by two English physicists, who found that oscillations of very sensitive compass needles were more pronounced during years of sun-spot maxima—that is, once every eleven years. Connected with these oscillations, which sometimes became so violent as to justify the term "magnetc storm," there appear in the sky the so-called Northern Lights or the Aurora Borealis. So well established is this connection that whenever on the Pacific Coast we see the Northern Lights it may safely be predicted that a large spot is coming around the limb of the sun and that a violent magnetic storm—shown by oscillations of sensitive compass needles —is in progress.

EFFECT ON LISTENING-IN

The connection between sun-spots and radio transmission and reception may scarcely be said to be established at all. The predicted effect would be that a listener-in who constantly heard Calgary, say, during a time of sun-spot minimum would not hear it, or would pick it up only with difficulty, during a time of sun-spot maximum. Quite the reverse might be the case for a station still farther east, or a station broadcasting on short wave length. I believe it is probable that some such effect is present, tangled up with other sources of disturbance; and that view is made the more reasonable in the light of recent reports of the difficulty of radio-reception during the time the Northern Lights are brilliant.

Least well-established of all is the relation between sun-spots and the weather. The earliest attempt to correlate the number of sun-spots with the weather was made some 125 years ago by Sir William Herschel. In view of the paucity of the data at his command he made out a surprisingly good case for the view that the more sun-spots there were the better the crops, that is, on the average, the better the weather.

A "SUMMERLESS" YEAR

Later investigators have inclined to the opposite view that the more numerous the sun-spots the worse the weather, and have maintained this view by numerous interesting analyses of weather in different parts of the earth. Some of these investigators even went so far as to predict a summerless year in 1926 by reason of the exceptional sun-spot maximum at this time. It need scarcely be said, in view of the beautiful summer which has just terminated, how wide of the mark that prediction was, and it only serves to show how uncertain is the connection between weather and sun-spots.

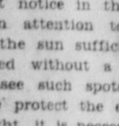
In view of the evidence presented, there can be no doubt of a connection between sun-spots and magnetic storms; some doubt as to a connection between sun-spots and radio transmission; and lastly, the case for a relation between sun-spots and the weather must so far be regarded as not proven. Of many conflicting theories which have been advanced to explain these interconnections I select the one that is least unsatisfactory. We have noted that at times of sun-spot maximum the sun pours forth about twice as much ultra-violet light as normally.

FORMATION OF OZONE

The action of the ultra-violet light is to form from the oxygen already in our atmosphere more complex molecules of oxygen, the resulting gas being called ozone. Once this ozone has been formed high up in our atmosphere by the ultra-violet light from the sun, it slowly decomposes, giving rise, it is believed, though this point has not yet been fully investigated, to ions or conductors of current. It is believed that the "Heaviside layer" is formed in this way and it can readily be seen how the height and conductivity of that layer will vary with the amount of ultra-violet light emitted by the sun and so vary with the number of sun-spots. Variations in the "Heaviside layer" will produce the simultaneous magnetic storms observed on the earth and will certainly have some effect on radio reception.

Summarizing, we have seen how sun-spots were discovered by Galileo some three hundred years ago, how Schwabe found their eleven-year variation in number, and how modern investigation has led up to believe that they are cyclonic affairs due to some deep-seated, as yet unknown, disturbance in the sun. Also we have seen how, through producing a variation in the height and conductivity of the "Heaviside layer," the appearance of spots on the sun is the signal for magnetic storms on the earth and for possible effects on radio transmission and reception.

In conclusion it is interesting to reflect, in spite of this extensive knowledge, how much there is still unknown and mysterious about sun spots to stimulate further exploration and discovery.



TIMBER SALE X4302

Sealed Tenders will be received by the Minister of Lands at Victoria, B.C., not later than noon on the 23rd day of December, 1926, for the purchase of Licence X4302, to cut 6,841,500 F.B.M. of Spruce, Hemlock and Cedar, on an area situated on Maude Island adjoining Lots 460 and 461, Skidegate Inlet, Queen Charlotte Islands.

Two (2) years will be allowed for removal of timber.

Further particulars of the Chief Forester, Victoria, B.C., or District Forester, Prince Rupert, B.C.

NOTICE OF INTENTION TO APPLY FOR LEASE

In the Land Recording District of Atlin Mining Division of Cassiar District.

TAKE NOTICE that the Engineer Gold Mines, Ltd., Inc., a registered mining company operating within the Province of British Columbia, occupation, a mining company, intends to apply for a foreshore lease of the following described lands:—

Commencing at a post planted about 500 feet distant in an Easterly direction from the North West corner of Lot 4359, Skylark Mineral Claim, situated at the mouth of Wann River, on Taku Arm of Tagish Lake, thence in a Northerly direction 225 feet, thence Easterly 100 feet, thence southerly 150 feet more or less to high water mark, thence Westerly 100 feet more or less to point of commencement and containing 0.5 acres more or less.

Located this 16th day of August, 1926.

(Signed) H. McN. FRASER, B. C. L. S. Agent.

LAND ACT.

Notice of Intention to Apply to Lease Land

In Prince Rupert Land Recording District, and situate at Jedway Harbor, Queen Charlotte Islands.

TAKE NOTICE that Somerville Cannery Company, Ltd., Vancouver, B.C., occupation Fish Packers, intends to apply for a lease of the following described lands:—

Commencing at a post planted at the southeast corner of the Togo Mineral Claim, following the easterly boundary in a northerly direction 18 chains; thence northeasterly 11 chains to high water mark; thence southeasterly along the high water mark 18 chains; thence southwesterly 1½ chains, more or less, to the point of commencement, and containing 11 acres, more or less.

SOMERVILLE CANNERY COMPANY, LTD., Applicant.
Per E. D. Mathers.

Dated September 9th, 1926.

MINERAL ACT.

Certificate of Improvements

Sweepstake No. 4, Sweepstake No. 5 Fractional and Sweepstake No. 6 Fractional Mineral Claims, situate in the Atlin Mining Division of Cassiar District.

Where located:—East side of Taku Arm, near Sheep Creek.

TAKE NOTICE that Reginald Symes, barrister and solicitor, of 640 West Pender St., Vancouver, British Columbia, acting as agent for Sweepstakes Mining Corporation Free Miner's Certificate No. 13139, intend, sixty days from the date hereof, to apply to the Mining Recorder for Certificates of Improvements, for the purpose of obtaining Crown Grants of the above claims.

AND FURTHER TAKE NOTICE that action under section 85 must be commenced before the issue of such certificates of improvements.

DATED this 1st day of September, A.D. 1926.

MINERAL ACT

Certificate of Improvements.

Wann Fractional No. 2, Anyox and Juanita Mineral Claims, situate in the Atlin Mining Division of the Cassiar District, about one mile up stream from the mouth of Wann River.

TAKE NOTICE that The Engineer Gold Mines Ltd., Inc., Free Miner's Certificate No. 89770C, intend, sixty days from the date hereof, to apply to the Mining Recorder for a Certificate of Improvements, for the purpose of obtaining a Crown Grant of the above claim.

And further take notice that action, under Section 85, must be commenced before the issue of such Certificate of Improvements.

DATED this 1st day of September, A.D. 1926.

H. McN. FRASER, Agent

MINERAL ACT

Certificate of Improvements.

Brownie No. 5 Mineral Claim, situate in the Atlin Mining Division of the Cassiar District, on Wann River, adjoining and to the south of Brownie No. 4 M.C.

TAKE NOTICE that I, James B. Kershaw, Free Miner's Certificate No. 89663, intend, sixty days from the date hereof, to apply to the Mining Recorder for a Certificate of Improvements, for the purpose of obtaining a Crown Grant of the above claim.

And further take notice that action, under section 85, must be commenced before the issue of such Certificate of Improvements.

DATED this 1st day of September, A.D. 1926.

H. McN. FRASER, Agent.

WATER NOTICE.

Diverson and Use

TAKE NOTICE that Somerville Cannery Company, Ltd., whose address is Gore Avenue Wharf, Vancouver, B.C., will apply for a licence to take and use 50 gallons per minute of water out of small stream, also known as Hotel Stream, which flows northeast and drains into Jedway Harbor about 40 feet northwest of southeast corner of Togo Mining Claim. The water will be diverted from the stream at a point about 500 feet southwest of southeast corner of Togo Mining Claim, and will be used for industrial purposes upon the land described as 11.2 acres northeast of Togo Mining Claim. This notice was posted on the ground on the 9th day of September, 1926. A copy of this notice and an application pursuant thereto and to the "Water Act" will be filed in the office of the Water Recorder at Prince Rupert, B.C. Objections to the application may be filed with the said Water Recorder or with the Comptroller of Water Rights, Parliament Buildings, Victoria, B.C., within thirty days after the first appearance of this notice in a local newspaper. The date of the first publication of this notice is October 5, 1926.

SOMERVILLE CANNERY CO., LTD., Applicant,
By Fred DesBrisay Mathers, Agent.

WATER NOTICE.

Diverson and Use

TAKE NOTICE that Somerville Cannery Company, Ltd., whose address is Gore Avenue Wharf, Vancouver, B.C., will apply for a licence to take and use 50 gallons per minute of water out of small stream, also known as Mill Stream, which flows northeast and drains into Jedway Harbor about 300 yards northwest of southeast corner of Togo Mining Claim. The water will be diverted from the stream at a point about 600 feet from its mouth in a southwesterly direction, and will be used for industrial purposes upon the land described as 11.2 acres northeast of Togo Mining Claim. This notice was posted on the ground on the 9th day of September, 1926. A copy of this notice and an application pursuant thereto and to the "Water Act" will be filed in the office of the Water Recorder at Prince Rupert, B.C. Objections to the application may be filed with the said Water Recorder or with the Comptroller of Water Rights, Parliament Buildings, Victoria, B.C., within thirty days after the first appearance of this notice in a local newspaper. The date of the first publication of this notice is October 5, 1926.

SOMERVILLE CANNERY CO., LTD., Applicant,
By Fred DesBrisay Mathers, Agent.

Market Prices

LARD	
Pure	28c
Compound	25c
EGGS	
B.C. fresh, pullets	50c
B.C. fresh, firsts	55c
B.C. fresh, extras	60c
Local new laid ..... 65c and	70c
Alberta fresh, second	40c
FISH	
Halibut, lb.	25c
Salmon, red spring, lb.	25c
Salmon, white spring	12½c
Smoked kippers, lb.	15c
Kippered salmon, lb.	25c
Smoked black cod, lb.	22½c
Finnan haddies, lb.	20c
Salt mackerel, lb.	25c
Eastern salt herring, 2 for	25c
Salt codfish fillets, lb.	30c
Boneless salt cod bricks, lb.	25c
MEATS	
Fowl, No. 1 lb. ..... 35c to	40c
Roasting chicken, lb. ..... 45c to	50c
Ham, sliced, first grade	60c
Ham, whole, first grade	50c
Ham, picnic, lb.	35c
Cottage rolls, lb.	40c
Bacon, back, sliced	55c
Bacon, side ..... 50c to	65c
Pork, dry salt	35c
Ayrshire bacon, lb.	45c
Veal, shoulder	25c
Veal, loin	40c
Veal, leg	40c
Pork, shoulder	30c
Pork, loin	45c
Pork, leg	42c
Beef, pot roast ..... 12½c to	18c
Beef, boiling ..... 10c to	12c
Beef, steak ..... 25c to	40c
Beef, roast, prime rib	30c
Lamb, chops	50c
Lamb, shoulder	35c
Mutton, leg	40c
Lamb, leg	48c
Mutton, chops	40c
Mutton shoulder	30c
BUTTER	
Brookfield, Shamrock and Woodland, 2 lbs.	85c
E.C.D., 2 lbs.	85c
Capital, 2nd grade, lb.	40c
Fraser Valley, lb.	45c
CHEESE	
Ontario solids	30c
Stilton, lb.	35c
Kraft	45c
Norwegian Goat	65c
Napoleon Limberger	70c
Roquefort	75c
Swifts' Buttercup, lb.	45c
Gorgonzola, lb.	75c
McLaren's Cream, jars .... 45c and	85c
Gruyere	50c
Golden Leaf, lb.	45c
VEGETABLES	
New beets, bunch	5c
Beets, 6 lbs.	25c
100 lbs.	$2.75
New carrots, bunch	5c
B.C. Carrots, lb.	3c
100 lbs.	$2.25
Rutebagas, 6 lbs.	25c
100 lbs.	$2.75
Radishes, bunch	5c
New potatoes, 10 lbs.	25c
Potatoes, 100 lbs.	$2.00
Fancy B.C. tomatoes, per lb.	10c
Tomatoes, per basket	40c
Watercress, bunch	10c
Green peppers, 2 lbs.	25c
Cucumbers, each ..... 10c and	15c
Parsley, bunch	5c
Mint, bunch	5c
Leeks, 2 bunches	15c
Cauliflower, B.C., head 25c-35c	
Corn on the cob, dozen	40c
Green onions, dozen	25c
Terrace cabbage, lb.	6c
B.C. head lettuce	10c
Garlic, imported, per lb.	40c
B.C. Cooking onions, 6 lbs.	25c
Rhubarb, outdoor, 3 lbs.	25c
Wax and green beans, 3 lbs.	25c
Vegetable marrow, lb.	6c
Celery, 2 bunches	25c
Hubbard squash, lb.	7c
Citron, lb.	7c
Pumpkin, lb.	7c
Sweet Potatoes, 2 lbs.	25c
Egg plant, 2 lbs.	30c
Pickling cucumbers, lb.	15c
Pickling onions, 3 lbs.	25c
FRUIT	
Oranges, Valencias, dozen .. 25c to	75c
Lemons, Sunkist, doz. .... 25c and	35c
California grape fruit, 2 for	25c
Bananas, 2 lbs. for	35c
Candied honey	25c
Extracted honey, lb. .... 25c and	35c
Apples, McIntosh Reds	$2.25
Apples, Wealthies	$2.85
Apples, Gravensteins	$2.50
Cooking apples	$1.95
Canteloupes, each	15c
Peaches, case	$1.45
Italian prunes, crate	95c
Cocoanuts, each ..... 20c and	25c
Honey Dew melons, each	45c
Casaba melons, lb.	10c
Pears, Bartlett, case	$3.25
DRIED FRUITS	
Dates, bulk, 3 lbs.	35c
Dates, Dromedary	25c
Raisins, bulk, lb.	20c
Raisins, package, lb.	25c
Cluster raisins, lb.	25c
Lemon and orange peel	30c
Citron peel	50c
Black cooking figs ..... 20c and	25c
White figs, lb.	15c
Table figs, lb.	25c
Currants	22½c
Prunes	15c-25c
Apples	25c
Peaches, peeled	35c
Apricots, lb.	40c
NUTS	
Almonds, shelled Valencias	75c
Brazils and filberts	35c
Walnuts, broken shelled	50c
Walnuts, shelled halves	65c
Almonds	35c
Peanuts	20c
Manchurian walnuts	25c
California walnuts	45c
No. 1 mixed nuts	35c
SUGAR	
White, per 100	$7.10
Yellow, per 100	$6.60
FLOUR	
Flour, 49's, No. 1 hard wheat	$2.75
Pastry flour, 10's	65c
Pastry flour, 49's	$2.90
FEED	100 lbs.
Wheat, No. 5	$3.10
Oats	$2.60
Bran	$2.00
Shorts	$2.10
Middlings	$2.50
Barley	$2.35
Poultry mash	$3.00
Special eggmash	$3.40
Oyster shell	$2.50
Scratch food	$3.50
Beef scrap	$5.25
Ground oil cake	$4.75
Baby chick feed	$4.25
Fine oat chops	$2.70
Crushed oats	$2.70
Fine barley chop	$2.45
Whole corn	$3.00
Cracked corn	$3.10
Fine cornmeal	$3.10