Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☑ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☑ Continuous pagination/ Pagination continue
- ☐ Includes index(es)/ Comprend un (des) index

  Title on header taken from:/ Le titre de l'en-tête provient:
- ☐ Title page of issue/ Page de titre de la livraison
- ☐ Caption of issue/ Titre de départ de la livraison
- ☐ Masthead/ Générique (périodiques) de la livraison

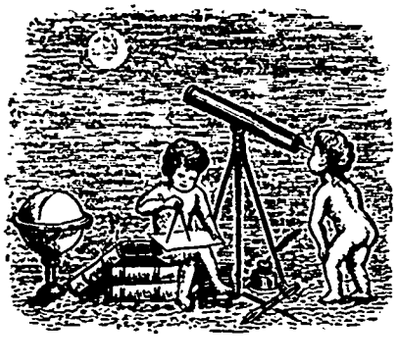
☐ Additional comments:/ Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
								✓			

Astronomy and Meteorology.

No. 4. MONTREAL, JULY, 1887. $1 Per Annum—Ten Cents Per Copy.



Astronomy and Meteorology.

PUBLISHED MONTHLY BY

WALTER H. SMITH,

31 Arcade Street, Montreal, Canada.

Astronomy.

A meteor, measuring 40 by 20 feet, is said to have fallen near Elmira, N.Y., on May 25. Notwithstanding its immense size, only one man is reported to have seen it!

A thirteenth magnitude asteroid was discovered by Charlois, at Nice, on May 28. This brings the number up to 267.

I hope to shortly continue my articles on "The Constellations," commenced in the defunct *Advocate* a year or two since. These, with short notices of the whole of the visible sky at intervals, will prove of value to amateurs wishing to localize the different stars and clusters.

Prof. Young declares that "each star presents a subject for spectroscopic study; for although, for the most part, the stars may be grouped into a very few classes from the spectroscopic point of view, yet in detail, the spectra of objects belonging to the same group differ considerably and significantly, almost as much as human faces do."

What an immensity of diverse conditions and possibilities as regards the forms of life pre-existing, now existing, or to exist on the millions of worlds circling these diverse suns, does this paragraph open to the thinking person. For if the constituents of these numerous suns differ as much "as human faces," must not the forms of life on their attendant worlds differ also?

PLANETS IN JULY.

Those who have not yet been able to pick up Mercury, "the only twinkler 'mongst the planet throng," will have an opportunity so to do at the entry of this month, when he is 25° 51′ E. of the sun. Look for a star of the first magnitude below Venus, toward the sunset point during the first five days.

Venus continues her outward course, passing *Regulus* on the 4th. She reaches her farthest limit east of the sun at midnight on the 13-14, being then 45° 33′ from the god of day. The moon is near her on the night of the 23rd. Ordinary telescopes ought to perceive the half moon shape of Venus this month.

Jupiter is 90° from the sun on the 19th, when he is overhead at 6 p.m. Notwithstanding his increasing distance, as yet he has lost but little of his lustre.

Saturn attains his solar conjunction and becomes a "morning star" on the 18th.

OF REAL VALUE.

Are astronomical researches—and particularly amateur ones—of any value? I reply, very little, in a direct commercial sense, my friend, if it is an answer on the dollars and cents side of the argument that you are aiming at. You are not perhaps one cent in pocket from your watching the heavens closely for the past ten years, on the contrary, you have been "wasting," as the ultra utilitarian will tell you, hours that might have been employed in increasing your bank account or the value of your real estate. But indirectly, I fancy you have gained a great deal. Your study of the noblest, the highest, the supremest of the sciences, has improved your intelligence. Standing with others who have not so "wasted their time" under the canopy of heaven, any starry night you are able to expound to such men truths which seem to them like marvellous tales from another planet, but which are real nevertheless, and cannot be refuted. Besides, with increased intelligence, your brain has been strengthened for the struggle after the daily loaf of bread that nearly all men are forced to strive for. Show me the members of any astronomical association, and I will show you men certainly not the least worthy of respect amongst their fellow-citizens. Such men will not have been drawn from the ranks of the idle or the shiftless, but rather prove themselves amongst the busiest. But let us leave utilitarian arguments and ascend to a higher level. What study will so ennoble the mind, or give man a proper sense of his relations to the rest of an infinite universe, leading him from himself up to higher and better views of his place in it, as a pursuit of the science of Astronomy? Those who smile at our devotion, should stop smiling and get to calculating. Let them tell us how many astronomers have been evil doers. Have not their lives rather been examples to their fellow-men? "By their fruits ye shall know them."

THE AUGUST ECLIPSE.

Scarcely any other astronomical phenomenon can be compared with that of a total eclipse of the sun, as regards both interest and importance. The brevity of the duration of the eclipse, the narrowness of the shadow of true totality—which is never over 100 miles wide—and the rapidity with which the shadow rushes along—30 miles per minute—together with the importance of the observations to be made, all combine to render a total solar eclipse of great interest. That of August 18-19, 1887, will be of more than usual import, as the shadow will pass over more of the inhabited portions of the globe than is generally the case. As a partial eclipse it will be seen from the Solomon Isles, in the South Pacific, to the East Coast of Iceland, in the North Atlantic. The line of totality is more circumscribed, of course, but even that reaches from the 170th to the 10th degree of East Longitude, crossing the Island of Rico de Oro and the City of Yedo, Japan, in the Northern Pacific, extending over the whole of Northern Asia, and the inhabited portions of Europe, passing a little North of Moscow, Russia, and crossing the Cities of Konigsberg and Berlin. Owing to the many possibilities of examination, it is consequently one of the most interesting eclipses. It is not visible in America, except that the moon will be seen to just graze the sun, by residents of Alaska Territory. The leading governments of the world have expeditions organized to observe, that of the United States proceeding to Japan. Astro-Meteorologists will remember the coincident earthquake phenomena that immediately followed the ecliptic conjunction of sun and moon at the end of August, 1886, and will be prepared to hear—in this earthquake period—of further disturbances. The meteorological conditions will doubtless be disturbed greatly, so much so that

humanity will suffer, owing to great storms, tidal waves, heat, and—being in the hottest period of the year—diseases of an epidemic nature. Next year's eclipses are: Jan. 28, 1888, lunar, total, and visible at Washington; Feb. 11, solar, partial, invisible; July 8, solar, partial, invisible; July 22, lunar, total, visible and Aug. 7, solar, partial, invisible.

Seybold Melbin;

OR,

THE WORLD OF MARS.

By Walter H. Smith.

"World of Mars:
Lives there a human brotherhood on thee
Without the sins and errors of mankind."

CHAPTER VI. *(Continued.)*

That these Martian maidens proved so well informed concerning earthly affairs, need not be subject for surprise, when it is remembered that information is continually being obtained from disembodied spirits, souls permitted to rest awhile on Mars. In point of fact, their earth news is but a few days behind our own, it being customary to publish in the journals of Mars, all the facts of public interest communicated in this way.

That winter afternoon began to draw to a close. Myrina remembered that it was past the time for their evening meal. "I should have introduced you to the rest, how thoughtless of me," she exclaimed. "But now it has become thus late, we may as well partake of the meal here. On Mars, even as upon your earth, we are not free from the dominion of the body; we have to eat to live, and to labor to be healthy."

"There seems to me no curse attaching to honest labor except in the minds of our lazy Orientals," I remarked.

"Curse indeed, no, rather a blessing. Who is there that can prove the idlesse of dreamy sloth equal to the inspiration of action; or that the stagnation of utter stillness is in any way comparable to the poetry of motion? We believe differently on Mars, anyway, where all is activity and progress. There are worlds, however, where the beings that answer for men in the scale of animate—I might almost say inanimate life—think differently, if they can be said to think at all. Such ideas find favor, for instance, on such a world as one that circles a star in *Præsepe*, where the inhabitants of an outer planet have an atmosphere that usually obscures their sun, and where the air is filled with a substance which, by simply breathing it, sustains life, and the heavy atmosphere is filled with moisture. A condition of things similar to your modern Turkish bath is therefore continual, and the men themselves are of the consistency of oysters.

"Your remarks remind me of the astronomical myths of that noted Frenchman, Flammarion," I said.

"Myths! Your Flammarion never imagined beings one quarter as curious as those that actually exist. We are your next door neighbors, therefore are similar to you. But pass away out to other planets, from these, proceed to other systems, and you will find the divergence in structure and conditions grow ever wider as you proceed. As the animals of your torrid differ from those of your frigid zones, even so the highest types of existence vary on the various worlds at present sustaining life."

"On the earth at least we can have but little to say against those inhabitants in *Præsepe*. It is the exigencies of our animal existence that urge us to action. With many of us, the condition of these human oysters you have spoken about would be considered as a perfect existence. Plenty to eat and nothing to do. This were surely the seventh heaven of the human animal on earth!"

"Which brings us back to where we commenced," said Myrina, smiling, "Bid them bring refreshments, sister."

The younger lady here touched an electric bell, which chimed out with silvery clearness, I counting as it rang:

One! two! three! four!—

At the first stroke I was startled; at the second I thought that I recognized the tones; at the third I had left Myrina, and at the fourth—I awoke, chilled to the bone, as the mean time clock in my observatory struck the hour. It was four o'clock in the morning, as, rising from my chair, I opened a window in my turret and looked forth. Venus had arisen in the East:

"Fairest of stars, last in the train of night,
If better thou belong not to the dawn
Sure pledge of day that crown'st the smiling morn,
With thy bright circlet."

Traces of dawn were just visible, as the twilight, grey and cold-looking, crept up over the silent plain. From the distance, came in drowsy tinklings the sound of the sheep-bells, and near by, that grim cairn, Stonehenge, rose stolid and majestic as always. Away beyond, sinking down in the darksome West, the fiery Planet of War kept watch, refusing

"To take its flight,
For all the morning light,
Or Lucifer that often warn'd him thence."

Red and bold its eye gleamed like a small ruddy moon. I stood looking at it till the daylight forced it to creep within itself, shunning my gaze. Hide thyself now thou lurid one, yet shall the spirit of mortal return again to thee, searching out that which infinite distance strives, but vainly, to conceal!

CHAPTER VII.

CITY LIFE AND DUAL IMPRESSIONS.

Thus commenced for me a history apart from the world and its surroundings. I led a double existence, and the ideal seemed the most real. I believe it is often thus with the abstract thinker. Were not Juliet and Ophelia more to the ideal life of a Shakespere than the existence of Anne Hathaway think you? Was not the beauteous Eve more to a Milton than his petulant, runaway, Royalist wife? Surely, yes.

At first I was bewildered. I passed from my observatory, locked the door, walked to my parents' house, bathed my face and threw myself down—but not to sleep. Thoughts of the scenes I had returned from, thronged my brain. And then I began to question whether what I had experienced could by any means be anything else than a dream. Reason assisted me to such a solution, but experience rejected it. Finally, I became convinced that what I had witnessed was not a vision but a reality.

More silent than before, I shunned even the company of my parents, making answer that I was somewhat out of sorts and wished to be left in quiet. My mother proposed a visit to the seaside, and an abandonment of study for a while, my father talked of consulting our good family physician, Dr. Gibb. At the moment, I was disinclined to accept either alternative.

It was with much impatience that I awaited the shades of night and the rising of Mars. I walked into the more lonely portions of our park, and heard by none but the timid deer or startled hare, repeated over and over my Myrina's name.

When night commenced I was early at my observatory, but was forced to put up with a delay, as scattered clouds were scudding across the summer evening sky, one, to my disappointment, drifting across the disc of Mars, so that a considerable time elapsed ere his red face shone out through a rift. I did not doubt now, not I! My hands trembled so with nervous excitement that I could scarcely focus my telescope, but by and by I succeeded. My eye again grew tired because of the planet's painful glare; once more I turned aside and—once more an experience similar to that of the previous evening was repeated.

Again I approached the world of Mars. But the hour was later, owing to my delay, and the noon mark had moved a considerable distance westward. I alighted, in consequence of the motion of the planet on its axis, near that forked bay of which I previously spoke, and had the satisfaction of seeing as I descended, that a city stood on the innermost fork, over whose placid harbor glided—propelled by electricity through the calm waters at a high rate of speed—hundreds of

vessels, some heading for the open ocean which spread out toward the South-West, others for the opposite shores of Phillip's Island,—that could be dimly seen in the distance;—and others again shaping a South-Easterly course through the strait that separates Dawe's Continent from Phillip's Island were passing out into that broadest of Martian waterways, Dawe's Ocean.

Nor vessels only. Air boats from every quarter of the compass were also arriving and departing, and o'er the broad highways, inland, strings of cars shot to and fro. Temples of immense height—it is easier to build here, owing to the lessened gravity, and stones are consequently very much less weighty—residences of considerable grandeur all of one story, and other large one-story buildings—each covering a great deal of ground, were to be seen on all sides. It again struck me that I had seen something similar somewhere or other before, but it was not until the next day, when I happened to look accidentally at a painting by Martin, that I saw the same grandeur of architectural conception as that in use upon Mars. Looking down upon the streets, I saw that they were broad, very smooth, very hard, very clean and well ordered, with runnels of pure water at each side. The town on every hand but that toward the lake, was *surrounded with an artificial forest* planted in order to induce rain whenever possible, the rain drops gathering very reluctantly in the thin, dry, frozen atmosphere of a dying world, even at a spot only 12° degrees from its equator. The trees were also planted for use, that is, for building purposes, fuel, etc.

Passing along one of the broad business thoroughfares, where, if noticed at all, I was taken, doubtless, for a disembodied spirit and left unmolested, it was directly apparent that the object of every merchant was not, as with us, to cheat his customer if possible, nor the object of the customer to, if at all feasible, overreach the merchant. Although, as with us, the laws of supply and demand come into play, great care is taken that the supply shall at all times equal the demand, and even when a temporary stringency is felt, as it sometimes is, the merchant is not allowed to overreach the buyer, because the prices for all commodities are fixed by statute, which there is no gainsaying. But a sinless merchant and a sinless purchaser have no wish to overreach, their interests are in common, and all things work in perfect harmony.

Life is naturally very calm and equable on Mars. For although electricity stimulates to great energy in many cases, the absence of animal food, fermented liquors,—for this process if known—is unpractised—bodily sickness, or mental depravity; makes life flow on peacefully and happily and a length of life approaching one hundred and fifty of our years is not uncommon.

Noticing a merchant stop suddenly in the street, commence talking in low tones as though he were conversing with another, and, seeing no person listening to him; I made bold to enquire of the first one who passed me, what our neighbor was doing. The one accosted saw that I was a stranger and replied, smiling;

"Theta is conversing with another merchant four hundred miles away about a cargo of grain recently shipped, it is simply a case of dual impression, such are very common on this planet."

I bowed my thanks and passed on. Immediately the thought struck me, can I not inform Myrina that I have arrived, and that I am hastening to greet her? No sooner thought than accomplished, I fixed my mind upon her and there was an immediate interchange of thought. In half a dozen words I bade her expect me in a short while, especially when Myrina said that the train of cars just about to overtake me would pass the high-road opposite her father's house. Hailing them, they drew up in less than their own length. I entered, and they started on again in a moment. The coaches I found exceedingly elegant. These, when two or more persons travel together, can be hired for the party's exclusive use. The motive power is electricity, the machinery for the supplying of it being beneath the coaches. By a peculiar contrivance the force expended does not run to waste as with us. By the friction of the wheels it is continually regenerated over and over again. Travelling at an extreme rate of speed, the range of mountains on which I had yesterday alighted soon came into view, and, just as we reached the avenue that led to the parental mansion of Myrina, I seemed to hear her voice telling me to alight. In a moment, I impressed my wish on the attendant—although at the time he was at the opposite end of the car—each car having a special attendant—and the train stood still. He, knowing that I was embarassed about something, came forward and requested me to alight, so that the train might proceed.

"But I have no money wherewith to remunerate you," I said.

"We have a special statute that provides for visitors from other orbs travelling over all our lines free of toll," he replied. "*Angelic wisdom guided us in* our road building as well as in shaping our inventions, and it is the least we can do in return to accommodate those who will soon be with the angels." He with others, took me for a spirit disembodied. I alighted, the train moved off, and was out of sight by the time I turned into the avenue.

CHAPTER VIII.

A FORECAST.—LITERATURE AND ART.

In approaching the conservatory, one of those peculiar reactions came over me *that all must have felt during their lives.* As I stepped from the car, I was thrilling with the joyous expectation of a second meeting. Ten seconds later, I felt as if a calamity of the direst kind had overtaken me. Yet I could have given no explanation why the change should have taken place. Bounding forward to meet my beloved, I was suddenly arrested by something, I knew not what. All around remained the same, yet all seemed immediately changed. And the something that so changed my feelings was—what? The magnetic influence of a great sorrow at that moment affecting Myrina.

We met at the door of the conservatory. Myrina was alone. Shyly chiding me because of my delay, her face, as it looked down on mine, showed traces of a sadness, a sorrow of great weight, yet borne with the fortitude of an angel. Had Myrina been of the earth I should have seen traces of tears, but no such crude expressions of sorrow are indulged in upon Mars.

"May I not share your grief," I asked, as we sat once more together watching the fountain's spray.

"Surely, yes," replied Myrina, resting her hand in my own, "Scarcely had you left us last night when two of our seers, whose lives have been passed in continual contemplation of the past history of the house of Am-Ram, and almost perpetual calculations concerning its future; waited upon me. They had much evil to communicate concerning your future and mine.

"But how was it possible for them to speak concerning the future. Away with such credence. Put not your trust in charlatans, Myrina."

"My poor Seybold, you know not what you say." Myrina gazed at me pityingly with her fair sad eyes, and the conviction that my beloved spoke the truth, silenced my remonstrances effectually.

"Listen," she said; and I obeyed. "Every atom of the uncountable myriads that go to make up the Universe—visible and invisible—acts on every other atom. Were it possible to tear the giant Jupiter from his twelve year circle, and to place him in the orbit of Mercury, there would be chaos in this solar system in a brief space! All suns, all planets, affect all other suns and planets, and the atoms which go to make up such suns and worlds, be those atoms animate or inanimate."

(To be Continued.)

Weather Forecast.

JULY, 1887.

A hot July, with muggy, oppressive weather, too dry in many places, and streaks of heavy rainfall in others, at present writing appears most likely. The likeness of the present season to that of 1881 will continue. In that year, April was a dry month, the drought increasing in May in places, and diminishing in others through part of May and June. An almost exact counterpart of 1887. What followed? The heat of July and August that succeeded the relapse in June was extreme, the thermometer at New Orleans rising during July to 100°. At one station in Ontario the mean temperature of July, 1881, was 88° 9′ in the shade, the thermometer exceeding 90° during no less than seven days in the month of May that year. How very similar to this! The special crop reports that so many are watching with anxiety will grow more and more interesting as the Summer goes on. At the time of writing the reports say that "the season continues a very streaky one so far as the disposition of the rainfall is concerned," and, further, that "there are no areas suffering from too much rain." My readers will perceive at once that my forecast of dry weather has been amply borne out by facts. The wheat crop in Western Kansas is already declared a failure, owing to the dry weather and insects ("an insect pest Summer"). The corn crop, I said, would succeed, and it is gratifying to note the excellent reports coming in from many sections concerning this important cereal. In some parts of the Far West, however, it has been too dry for corn even. The grass crop—in the West and South-West, especially—could not, under the circumstances, be even an average crop. But July will assert its prerogative in the way of heavy showers and disastrous local storms, just as well as by its waves of extreme heat. Sandwiched in between these, let no one be surprised at the occurrence of one or two unfavorable cool spells. An extended forecast follows:—

Opening days, July 1 and 2: Cool weather for July—Wind, rain and hail storms.

First Week, July 3 to 9: Warmer, unsettled, thunder storms general—Hot, cloudy and murky—Very hot in Southern sections—A cooler change—Dry in the N. and N. W.—Rains in the S. and S. W.

Second Week, July 10 to 16: Favorable summer weather—Cooler, high winds and showers, possibly frosts in the N. and N. W. States and Canada, followed by generally heavy showers, with wind, thunder and hail storms, cool nights—End of week fine.

Third Week, July 17 to 23: Fine, hot and favorable—Storms of heavy rain, thunder showers and high winds—Cool weather N.; cool in S., with showers and rain storms—Nights quite cool—Fine and hot at the close.

Fourth Week, July 24 to 31: A hot wave, great heat general—Very hot in the S., S.W. and W.—Disastrous storms W. and S.; heat and thunder universal, with high winds, gales on Lakes and Atlantic and Auroral displays—Month ends showery and cool.

EARTHQUAKE NOTES.

The June number of ASTRONOMY AND METEOROLOGY had hardly left the printer's hands, ere my expectations of additional earthquake tremors were realized. A heavy shock of earthquake was felt at the City of Mexico and vicinity at 2.50 A.M. on May 29. The weather there had been extremely hot during the previous three or four days, with great whirlwinds on the afternoon of the 28th. While these events were transpiring in Mexico, similar disturbances were happening the same day at Teei and Ancona, Italy. Shocks were felt in Arizona next day, and at Jamestown, N.Y., on May 31. Mount Etna was in eruption at the same time. Students of Planetary Influence will notice that Mercury was in perihelion at 9 p. m. (Montreal time) on the 28th, and that he passed superior conjunction on the day previous. As concerns future seismic shocks, the indications seem to point to a continuance of them in July, and, should there be considerable dry, hot weather, earthquakes of no common order will be recorded in August.

NOTES.

May was to end "cool, with rains." It was also to close "stormy, unsettled, with high winds and gales." New York reported 1½ inches of rain on the night of May 31, the water "coming down in sheets." The wind blew a gale along the coast.

"C. B. M." writes from Minn.:—"'Stormy, unsettled, high winds, cool,' said your forecast for May 29-30. This was correct here. A little past noon on the 29th, we had two hail, rain and thunder storms, with strong wind. To-day (30) is cold, rainy and windy."

Association.

Mr. Pigeon's paper on "How to Construct a Cheap Astronomical Telescope," published in this issue, will be read with great interest. It has already had the effect—judging from several letters—of stimulating the latent love for Astronomy that exists in almost every bosom. In order to meet the wishes of a number of French speaking citizens, the paper is to be translated and reprinted in that language in *Le Monde Illustré*, Montreal.

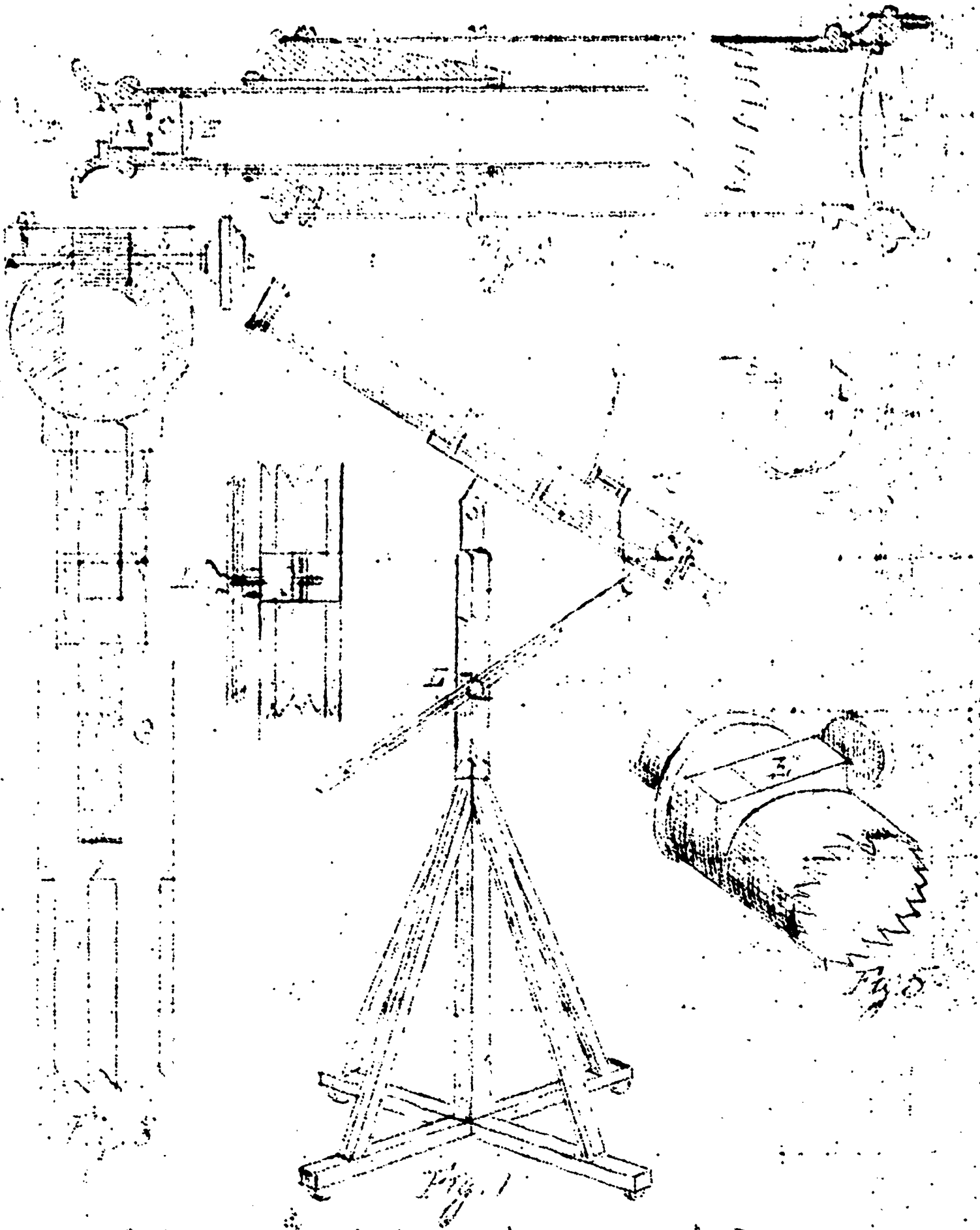
Vice-President Heatwole recently lectured (by request) on "Astro-Meteorology" before the students of the Shenandoah Institute, Virginia. He was extremely well received, and listened to with much attention. At the close of his remarks, Mr. Heatwole placed several dozen copies of the *Planetary Almanac* on the table, a present from the author. They were received with thanks, in fact, after a few minutes, there was not a copy left.

The Astro-Meteorological Association when founded in October, 1884, had 14 members. It has now (June, 1887), 83. Amongst its members are five clergymen, five medical men and five editors, besides several presidents, officers and members of sister scientific societies. The increase in associates during the past session amounted to over 40 percent. The lady associates now number seven.

JUNE MEETING.

"HOW TO CONSTRUCT A CHEAP ASTRONOMICAL TELESCOPE"—"METEORITES, THEIR EFFECTS AND INFLUENCE"—A TELESCOPE COMMITTEE APPOINTED—THANKING THE PRESIDENT.

At the twenty-fourth monthly meeting of the Central Committee of the Astro-Meteorological Association, held in the Fraser Institute, Montreal, on the evening of Friday, June 3rd, there were present:—President Walter H. Smith; Councillor the Right Rev. B. B. Ussher; Treasurer M. Austin; Associates: J. S. Vipond, A. J. Pigeon, George Creak, E. W. Beuthner, Sydney Ussher, H. Wray, J. Parratt, Mrs. Parratt, and Mrs. Smith. Two or three non-members were also present.



This being considered an adjournment from the May meeting, minutes were dispensed with. Letters, regretting inability to attend, were read from Secretary Brown and Associate J. C. Weir.

Mr. Weir's letter to the President read as follows :—

DEAR SIR,—In reply to your much esteemed letter of May 5th and copy of your paper containing article "Think It Over," I think that that article should meet the approval of all the thinking people in favor of progress. The noble example set by the Illinois Legislature is a high tribute to science, and I hope before long to see it passed in the Dominion. But, dear Smith, do not be discouraged at the seeming indifference of our people, as you should not overlook—might I say the crude state of the masses here. We are only emerging from the forest, where Art and Science has had little or no consideration. Do you not think the Dawn is on now? There is a nucleus, not insignificant, I trust, at the Fraser Institute, and it will increase. I hope you will get help to push on the work you have undertaken through love.

The writer sincerely thanks you for the kind invitations you sent him, although unable, through absence, to attend your last meeting. You will please excuse, if I don't come to-night, owing to pressure of business. I have No. 3 of ASTRONOMY AND METEOROLOGY, and hope the little satellite will keep above the horizon. First steps are the hardest, you know. Yours truly,

J. C. WEIR.

P. S.—Please find enclosed $1.00 for subscription to "A. & M."

The following were nominated for membership:—By Associate A. J. Pigeon: Mr. E. C. Landon, Montreal. By the President: Messrs. Thos. Birt, Utica, N.Y.; Henry B. Small, Ottawa, and Miss Isabel Grant, Ottawa. The rule requiring a month's interval between nomination and election was suspended, and the applicants declared duly elected.

The President remarked that it was truly gratifying to see how the membership roll was increasing. With the Associates of Branches he understood there were now over 80 members.

Mr. A. J. Pigeon was requested to read his paper, entitled, "How to construct a cheap astronomical telescope." Full sized diagrams, prepared by himself, were shown, the reading of the paper being frequently interrupted by members asking for additional explanations, which Mr. Pigeon was most ready to give. The paper (as read) follows:

"I fear that my subject will create no little surprise. I doubt not but that some of you have had more frequent opportunities of using telescopes than I can lay claim to have had.

"In order to create a love for our science, as well as to facilitate our approach to it, it is of the utmost importance that the telescope—the giant eye of the astronomer—should be efficient, as low in price as possible, and devoid of all superfluous accessories. These latter only tend to place a telescope beyond the reach of the impecunious lovers of the science.

"It is not necessary to have a powerful instrument to enable one to add to the important discoveries in Astronomy. Mr. Goldschmidt, a distinguished artist, who suddenly displayed a taste for observation at an advanced age, has justly acquired renown as the discoverer of fourteen asteroids with a telescope of 5½ inches aperture, used in his humble mansard studio in Paris.

"The principal astronomical discoveries have nearly all been made with small instruments, constructed by the observers. It is only in comparatively modern times that the optician has had the making of instruments, thus unnecessarily increasing their cost, without in the least making them more efficient. The manufacturer of telescopes, as a rule, seldom grinds the lenses of which the instrument is composed, he merely mounts them, and it is to his interest to make it as highly finished and complicated as possible.

"To the amateur observer there are certain accessories which are not really necessary, such as an equatorial mounting, clock-work movement, rack and pinion movement, finder, etc.

"Before I enter into the details of the telescope's construction, allow me to give a brief history of its discovery, which seems to have been due to chance. This discovery was made in Holland about the beginning of the 17th century. 'About 30 years ago,' says Descartes in his '*Dioptric*,' 'James Metius, an uneducated man, who took pleasure in making mirrors and burning glasses, having on a certain occasion lenses of different forms, he unthinkingly looked through two of them, one convex, another concave, and applied them so happily to the end of a tube, that the first telescope was the result.

"On the other hand, the opticians Jansen and Lippershey, of Magdebourg, are given the credit, if not of being the inventors, at least of having perfected the instrument.

"Lenses used in telescopes and microscopes have their surfaces ground in such a manner as to change the direction of the rays of light passing through them; this is due to 'refraction,' that is to say, that a ray of light in passing from a transparent medium into another of a different density is bent obliquely towards the perpendicular more or less, according to the difference of density.

"It is quite evident that without refraction, which at first sight may seem troublesome, we would have no lenses, consequently no optical instrument; it would even be impossible for the eye to exist.

"The focus of a lens is that place back of it to which parallel rays are converged or gathered to a point; the focal length being measured from that point to the lens. Convex lenses collect the rays to a point, and are consequently called converging lenses, while concave ones scatter them, and are therefore called divergent.

"It is always a lens of convex form that is placed towards the object, and is therefore called the 'objective;' it gives a very small and brilliant image in its focus, fringed with prismatic or rainbow colors, when that lens is a single or uncorrected one. An achromatic, or corrected lens, is composed of two lenses, one convex, of crown glass, and one concave, of flint glass. This combination corrects the chromatic aberration of the single convex lens.

"When the lenses of the eye-piece are convex, they are placed in the focus of the objective; and when a concave lens is used, it is placed a little in front of the focus, amplifying the image by dispersion. It was by this last arrangement that Metius stumbled upon the discovery of the telescope, a vague description of which reaching Galileo, the latter constructed his first instrument. Kepler first conceived a combination by which he employed two lenses in the eye-piece as it is now made.

"The 'field' of the telescope is the circular space of the heavens we see when looking through it. Its apparent size is more or less according as we use a lower or higher power.

"The geometrical ratio of the focal distance of the two lenses measures the power, and this principle would open a possibility of indefinite amplification were it not for the difficulty of making the lenses as well as the unwieldy length of tube, which reduces the possibility to very narrow limits.

"When we speak of a telescope having a power of, say, one hundred, it means that we see the object at an angle one hundred times wider than by the naked eye, and not that its real size is multiplied by one hundred. Opticians generally estimate the power of an instrument by the size of the aperture, and not by the length of the focus; there is a certain relative size between the aperture and the focus of a lens, beyond which the instrument would be next to useless: for instance, given two lenses of equal focus,—say 36 inches—one of 3½ inch aperture, the other 1¼ inch, the first would show an image without any definition, owing to an excess of light, the

last would have great definition, but its field being so limited it would lose it, with the least vibration of the instrument.

"If the relative size is kept within proper limits, all things being equal, density and clearness of glass, etc., the instrument which has the longest focus, although of small aperture, is the most powerful and will do the best work.

"I give the length and aperture of a few of the principal telescopes, makers' names, and where erected :—

Maker.	Where Erected.	Length in feet.	Aperture in inches.
Dien	Universal Expos., 1855	42.0	22
Porro	Paris	49.3	20½
Mertz	Expos., 1867	25.8	18
"	Pulkowa	21.4	15½
Secretan	Paris Observatory	16.8	12
———	Munich "	16.8	11½
Mertz	Copenhagen	18.3	11½
"	Roman Coll. Equatorial	14.6	10
Frauenhofer	Dorpat	15.1½	9½
Lerebours	Paris	11.0	9½

"In the construction of a cheap telescope, the objective is the only part on which to make any considerable outlay. Suppose an achromatic lens of 36 inches focal length, 2¼ inches in diameter, has been chosen, and that we wish to mount it permanently. We *will* make the cells of mahogany, cherry, black walnut or hard maple (mine are of lignum vitæ) well seasoned and varnished inside and out to protect them from absorbing moisture from the air; a wood turner will furnish wood and turn three pieces for about $1.50. For a focussing tube get a piece of brass tubing, 12 inches long by 1¼ inch outside diameter; a tin tube would be a cheap substitute.

"The eye-piece (fig. 2) is turned to fit inside this tube; a recess in the collar of the eye-piece will admit to glue in it a piece of felt or cloth, to keep it from falling out. A piece of wood, 3¼ inches in diameter, is bored out lengthwise, a little larger than the focussing tube. It is put on a wood mandril, centred and turned, as shown in fig. 2. It should be about 5 inches long and have a piece of felt, cloth or velvet glued at each internal end, so as to confine the friction to those parts only.

"An arrangement for focussing is made as indicated in figures 2 and 3. The tube is slightly filed across so as to give it sufficient grip for the rubber-covered spindle to move it back and forth. The objective is secured in its cell (fig. 4) against a shoulder, from the front, by a piece of spring-wire bent in the shape of a ring. This facilitates the removal of the objective without removing the cell.

"To make the body of the telescope, take a piece of wood about 3 inches diameter and 33 inches long. Turn it into a roller. Upon this roll a piece of pasteboard, previously thinned on the longitudinal edges and pasted or glued on the outside. Secure until dry; before taking it off the wood roller it would be well to cut the ends of the paper tube 31 inches long on a lathe so as to ensure the mounting of the cell and collar (fig. 2) centrally. The cell is secured at one end of the tube by three round head screws and the collar in the same way at the other end. Four round head screws toward the tapered end of the collar regulate the axis of the focussing tube in line with the objective. Insert into each end of the brass or tin tube, a disk of cardboard having a pinhole centre, remove the objective from its cell and replace it by a similar disk with central pinhole. Place a light (this had better be done at night) in front of the objective end of the telescope, now work the four screws, until, when looking through the eye-piece end of the tube the three pinholes coincide and show a small star-like light in the objective disk. The astronomical or celestial eye-piece is composed of two plano-convex lenses with their convex side toward the objective. "A" (fig. 2) is called the eye-glass. "B," the field-glass. The eye-glass should be one inch focus, and one-half inch in diameter; the field-glass, 2 inch focus, and ¾ of an inch in diameter. These should be placed in the cell at a distance of 1½ inches apart, with a diaphram ("C,") having an opening of about ⅜ inch placed a little in front of the focus of the eye-glass. When observing the sun, use a piece of black glass, cut out of the side of a flat bottle, as described by Mr. W. H. Smith in No. 2 of Astronomy and Meteorology, secured against the flange "D" and held by a ring of spring wire. The lenses and diaphram are also secured in their cell in the same way. Figure 5 shows the perspective view of the rubber pressure roll for focussing; a mortice is made in the collar (fig. 2) to receive it, and the spindle; a piece of wood is shaped, as shown at "E." It is hollowed out underneath so as not to interfere with the rubber roll; a piece of thin brass or tin is perforated and bent, as shown by figure 6, passed under the body of the telescope and is secured in its place by a screw, after the tube is found to work smoothly.

"A pedestal is made of pine, 4 feet 3 inches high, 3 x 3 inches square, and braced as indicated by figure 1. Two inch pine will answer for the base and 1 inch for the braces. The vertical movement is shown at "F," (fig. 3) and the horizontal at "G."

"Such an instrument can be made (if one has sufficient skill to mount it himself) for about $10. It will give, if properly mounted, as good results as one of the same size, catalogue price in Paris $28.00, without pedestal, which, laid down in Canada or the United States, would cost about $12 more. It would bear a terrestial eye-piece of 35 and an astronomical one of 90.

"A still cheaper mode of mounting would be to make the paper tube as above, slightly larger than the diameter of the objective, and to glue internally, near end, a strip of pasteboard as a shoulder for the lens to rest against, a piece of pine would do for the collar, a tin tube for the focussing tube or even a paper tube, if shellacked, would answer. The eye cell can be made of pasteboard, with sections of lead pipe as flanges for the lenses. A cardboard diaphram between the lenses as indicated in figure 2. Great care will have to be taken to mount the lenses of the eye-piece centrally and perfectly parallel on their flat sides. The body of the telescope may be painted or covered with bookbinder's cloth or paper and varnished; while the inside of it should be blackened as well as the cells and focussing tube with a mixture of lampblack, spirits and shellac.

"Although not indispensable, a finder, "K," (fig. 1) should be provided for this instrument, as it is very difficult to bring an object into its field when using a high power. A good substitute for a finder is the toy telescope; a fifty cent one is attached to the body of the telescope by means of straps or other devices. After focussing the telescope on a very small distant object, which should be in the centre of its field, focus the toy telescope on the same object and when both are central, secure.

"Such is the astronomical telescope in its cheapest form; is it not astonishing that such a little outlay will secure the enjoyment of seeing several celestial wonders, such as the craters of the Moon, the phases of Venus, the satellites and belts of Jupiter, the ring of Saturn, the spots on the Sun, beside some of the double stars and nebulæ.

"In conclusion, I would strongly advise you, by all means, to get a telescope, however small it may be. You will love the science of astronomy the more you see, and the more powerful the eye you use, the more enjoyment you will have.

"My intention, when I first thought of this subject, was to fully investigate the powers of small telescopes and what they reveal, but as this was recently so ably treated by our President in his paper on "Small Telescopes and What They Reveal," read before our Association and published in the May number of Astronomy and Meteorology, I consider my task ended. I can only add that my reward will be great if I have succeeded in convincing you to try your skill in constructing a telescope.

The discussion on this paper closed by the President informing the meeting that the lowest estimate for lithographing and furnishing 500 copies of the diagrams was about $9.00, an outlay which the present straitened conditions of the finances as regards Astronomy and Meteorology did not warrant.

Mr. Beuthner, however, kindly came to the rescue by offering the use of his cyclostyle. The offer was, of course, accepted with thanks.

By request, President Smith followed with his paper on "*The Motion of* Storms," read at the fifth monthly meeting, March 6, 1885, and printed in the then organ of the Association, the *Advocate*, of Huntingdon, Que.

Diagrams of the rapid veering of the wind having been shown and commented on;

"Meteorites, their effects and influence," by Mr. H. Beaumont Small, was next read as follows:—"It is estimated that on any clear evening a watchful observer may see on an average two falling stars, or meteors as they are more generally styled, every five minutes, and at certain periods of the year in such abundance as to obtain the name of meteoric showers. These apparently emanate from some point of space known as a *radiant*, represented by a certain constellation, whilst single meteors appear to come from no particular point, but move in all directions and from every part of the sky; these are called 'sporadic.' In their normal condition these wandering bodies are known as meteoroids, regular circum-solar bodies, obeying the laws of motion and gravitation equally with the planets. Entering our atmosphere, they become self luminous from the heat engendered by friction with the atmospheric medium, and the arrested motion which produces a sudden compression of the air. In traversing a space of 50 miles the meteoroid, or meteor as it has now become, is heated, melted, evaporated and extinguished in a period of a few seconds. The height from us at which they become heated to visibility is sometimes 200 miles, but the average has been put down at 75 miles, and extinction at 50 miles above the earth.

"The diameter of Jupiter is 80,000 miles, whilst that of Clio is only sixteen. Chladin, a philosopher at the end of the last century, thought that bodies might exist as much smaller in comparison as Clio to Jupiter, coming down in the same ratio to one twenty-fifth of an inch, mere cosmic dust. Myriads of these may revolve in space without our having any knowledge of their existence; but, through some convulsion, or by some comet agency coming within the attractive power of a planet, fall towards it, and when entering its atmosphere go through the conditions of luminosity, fusion, &c. To this cosmic dust is now attributed the appearance known as the zodiacal light, for the sun, when below our horizon, reflects on the cosmical atoms of floating star dust and meteoroids, thus causing that soft glow in the western evening sky, just as a ray of light finding its way into a darkened room through a small orifice, reveals as motes floating in a sunbeam the particles of dust floating in the air of the room, but only visible when the ray of light falls athwart them.

"*Professor Newton, of Yale, considers* meteoroids as fragments of, or attendants on comets, the vast mass moving in a long, thin stream around the Sun, and the Earth at stated times in its orbit plunges through these, taking with its atmosphere each time millions of them. Each comet, in its orbit, bears with it these attendants, thus accounting for the different set periods of meteoric displays. Sporadic meteors of nightly occurrence are but outlying stragglers of a number of meteoroid streams, to find which, with their attendant comets, is the leading problem of meteor science to-day. Schiaparelli regards meteoroids as original inmates or portions of one of what he calls "star-drifts," attendant bodies which accompany in its journey through space the general drift or star-family, of which the Sun forms part. On this assumption, they are bodies from some more distant space than the star family of the Sun, wanderers from more distant star-drifts.

"The conflagration of a star through contact with a meteoroid is not unknown. Hipparchus records one seen blazing in full day, 2,000 years ago. Similar events are recorded in 945, 1264, 1572, 1596 and 1604. In 1673, another made its appearance, remaining visible for two years; in 1848, a similar event was noticed, and only a few years ago, another appeared, which Procter ably wrote on in *Belgravia*. In 1869, two meteoric masses were recorded as having fallen into our Sun, affecting the whole frame of the Earth and our meteorology. Vivid auroras were seen, where formerly they were unknown; electro magnetic disturbance was manifested all over the earth. The telegraphs in many places refused to work, and thorough electric confusion reigned for a time. The question then arises, may not meteoric matter influence the conditions of life on the earth both in the animal and vegetable kingdom, and may it not also affect the atmospheric conditions by impregnation with various forms of cosmic dust? The very air we breathe must at all times contain, in however minute a proportion, cosmic dust brought from interplanetary spaces, where different systems are differently constituted. The London *Lancet*, some years ago, remarked, it is not certain that deleterious results do not occasionally flow from an excess of some of the elements contained in meteors.

"Professor Roscoe goes so far as to conjecture that the soda which all accustomed to work with the spectroscope find present everywhere, may, by its antiseptic properties, exert a considerable influence in maintaining the public health, whilst a deficiency might result in the propagation of an epidemic.

"Atmospheric electricity is also now partially attributed to meteoric influence. Professor Govi, in 1878, argued that a *certain amount of heat is introduced into* our atmosphere by meteors entering it, and Professor Everett attributes the sudden variations of the needle of the electrometer from no apparent assignable cause to the same influence. May not sudden meteoric influence in like manner affect the weather and the seasons? The subject merits investigation.

The paper was followed by a short discussion.

Bishop Ussher here suggested the opening of a "telescope fund." The Association, with Mr. Pigeon's aid, might, he believed, easily put itself in possession of a good-sized instrument.

The President said a fund for the purpose existed, but had not been pushed. Subscriptions had last session been guaranteed to the amount of $62.00.

Bishop Ussher moved, seconded by Mr. Wray: "That it is desirable that this Association procure as soon as possible the lenses for an astronomical telescope, and that a committee for this purpose be named, composed of the President, Messrs. Pigeon, Beuthner, Creak, and the mover and seconder, who shall obtain quotations and other information, and report at next meeting." Carried unanimously.

The following additional donations were guaranteed: Bishop Ussher, $5.00; Mr. Vipond, $10.00; Mr. Wray, $5.00; and Mr. Austin, $5.00; making the sum promised, $87.00. It was also decided that the sub-committee be authorized to send circulars to members requesting subscriptions.

Bishop Ussher remarked that he could not allow the meeting to adjourn ere it passed a vote of thanks to the President for his earnest work, in the midst of such a busy life as his, as well as for his indefatigable efforts to advance the aims of the Association and the spread of knowledge.

The President said, smiling, that he supposed it was in order for him to put that motion. (Applause.)

Bishop Ussher asked to be considered Chairman a moment, that he might put the vote. He did so, and every hand was raised in the affirmative.

The President returned thanks in a brief speech, saying, that he did not consider that he had done much for the Association. He certainly felt that if he had more time he would like to do a great deal more. (Applause.)

The meeting adjourned at 10.20, until October, subject to the call of the President in the meantime.

Meteorology.

[To make the meteorological section of ASTRONOMY AND METEOROLOGY yet more complete, subscribers on all parts of the continent are invited to send notes on local weather and temperature. These should reach me not less often than once every month. Such notes will almost always be utilized.]

Ten thousand people, it is said, suffered from the Michigan forest fires this May.

On May 15-16 in the Northern portion of the Red River Valley, heavy frosts were reported, which cut down the new Spring wheat and damaged garden crops.

The hay crop in Quebec will, it is thought, be a light one.

The past Winter in Montana Terr. is said to have been the severest experienced for twenty-five years.

The amount of ice on the Cape Breton Coast at the end of May this year was unprecedented. One vessel was five days making fifty miles.

The Navy Department at Washington, owing to the number of abandoned vessels left floating around in the Atlantic, proposes that an International Convention be called and each country assigned a certain portion of the Ocean, which its vessels would patrol in order to destroy all floating obstacles.

Mr. Redman reports that April in his section of Illinois (Casey) was a fine month for farming, attended as it was, with good rains. These, however, were not heavy, but there was more downfall than during any previous month this year. The max. ther. at noon was 94° on 13, the min. at sunrise 24° on 5. The noon temp. on 12 was 90° and on 14, 88°. My forecast read, "Fine, seasonable, some warm days." On the 4th the min. ther. was 34° and the same on 6. Clouds and strong winds occurred during this period. My forecast read: "Frosts N." "High winds, unsettled," &c. The rest of the month appears to tallied just as closely with my calculations.

Mr. Birt's April record sent me from Utica, N.Y., gives the max. ther. as 73°; min. 15°, and mean 36° 14'. The max. bar. was 30.12; min. 28.62, mean 29.49. The greatest heat occurred on 10, and greatest cold on 8. His record for May states that the month was phenomenal, the warmest for the past 13 years. Max. ther. 88°; min. 37°; mean 62° 87'. Max. barom. 29.74: min. 29.13; mean 29.50. Furious electric storm, with heavy rain, on 24th.

In the North Atlantic, the first part of the month of May was characterized by strong gales from N.N.W. to S.W., extending all across the Atlantic, north of latitude 36°. The latter part was less windy with frequent heavy fogs north of lat. 40°.

At Montreal, for May 1887, the mean temperature was 61°.06', the greatest for the month of May in thirteen years. The max. temperature was 85°.5' on 10; minimum 40°.1' on 1, a range of 45.° 4'. The minumum temperature was 3° higher than any previous record for May. Rain fell on 6 days to the extent of only 1.26 inches, as compared with a mean rainfall of 2.92 inches. The maximum barometer reading was 30.351 on 14, minimum 29.554 on 26, or a range of 0.797 inches.

At Toronto, Ont., the mean temperature of May was 58°.51 or 6°. 51 above the average of tha past 47 years. It was 5.° 31 higher than May 1886. The rainfall was but 0.805 inches, or 2.292 inches below the average. It was the warmest May on record, the highest mean temperature previously on record having been 58°.10 in May, 1881. It was the driest also, if we except May, 1850, when 0.545 inches fell.

San Francisco, Cal., recorded its "hottest day for 15 years" on May 28. The thermometer at noon that day registered 97° in the shade; the previous hottest being 95° in June, 1883. A hot wind blew over the central parts of the state for two days, injuring wheat, strawberries and other things.

Slight earthquakes were reported from South Carolina, Nevada, and Northern California, on June 3rd. Murray Bay and Les Eboulements, Que., also reported the most severe shocks since 1870. Great rocks were hurled down, and trees levelled on the south shore of the St. Lawrence in L'Islet County. On June 4 a second shock was felt at Baie St. Paul, Que.

Wheat was being harvested in parts of Kentucky and Tennessee during the last days of May.

Correspondence.

[All letters should be addressed:—"Walter H. Smith, "21 Arcade Street, Montreal, Canada." For a personal reply, enclose stamp.]

A SIGNAL SERVICE OFFICER'S OPINION.

[15.] I have received two copies of that very valuable scientific journal, ASTRONOMY AND METEOROLOGY. Your predictions for April were *very* accurate, and up to this date (15) for May, have "hit the nail on the head" every time. Wishing you abundant success.

(Lieut.) W. H. I.
Virginia. Signal Corps, U. S. A.

SCIENTISTS SHOULD GIVE IT SUPPORT.

[16.] Your ASTRONOMY AND METEOROLOGY has been reaching me regularly. I am well pleased with it. The general get up of the paper is such as should command the attention and support of all students of the particular branches of science it so ably sets forth.

Virginia. L. J. H.

HEIGHT OF THE SNOW LINE.

[17.] What is the height of the perpetual snow line? Does it vary?

TRAVELLER.

Ans.—It varies considerably according to proximity to the equator, etc. Reliable estimates make it as follows:—Bolivia, 18,520 feet; Northern Himalayas, 16,620; Andes, at equator, 15,980; Mexico, 14,760; Himalayas, South side, 12,980; Chili, 12,780; Caucasus, 11,000; Pyrenees, 8,950; Alps, south side, 8,800; Alps, north side, 8,000; Alaska, 5,500; Kamschatka, 5,200; Norway, central portion, 5,000, and Northern extremity, 2,300 feet.

CANNOT YOU DO LIKEWISE?

[18.] Enclosed find postal order for $10 and subscribers' names. Have not been able to get any more yet, but will try hard. Wishing you every success.

Charleston, S.C. Y.

Ans.—If only *ten* more friends would do as much for ASTRONOMY AND METEOROLOGY, it would pay cost. Who will send for sample copies and try? One hundred more new subscribers could, I am sure, be easily obtained by ten of my friends in different sections getting to work in good earnest.

LIKES HIS PAPER. — THIS SUMMER'S WEATHER.

[19.] Your May number of ASTRONOMY AND METEOROLOGY is an admirable one, an improvement on No. 1. Your weather forecast for May has been *wonderfully true*. The oppressive and unseasonable heat commenced on the 15th as predicted. The hail storm arrived in time on the 26th, since which we have had steady precipitation of 1¼ inches up to now (May 29). The weather this summer for this locality, judging from the past, will be noted for sudden and severe changes, with periods of extreme heat. The long, heated and unseasonable term we have already had, I count in, as so much heat to be exempted from what is to come. The past winter was unprecedented here. Although we had over 100 days fair sleighing, there was no continued cold. After 3 or 4 days a sudden change would ensue, and *vice versa*. I did not mean to say as much when I commenced. I intended only to congratulate you on your work and wish it more publicity.

Albany, N.Y. R. L. BANKS, A.M.A.

Ans.—Your conclusions are scientific, and it will doubtless be as you expect. Accept thanks for kind congratulations.