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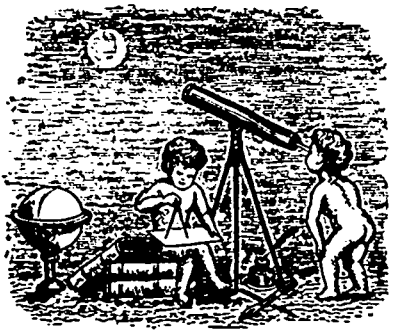
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Astronomy and Meteorology.

No. 6.

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Astronomy and Meteorology.

PUBLISHED MONTHLY BY

WALTER H. SMITH,

31 ARCADE STREET, MONTREAL, CANADA.

One hundred subscriptions are still needed to pay cost of printing. Is it the intention of my friends that I should publish this paper at a loss?

Astronomy.

The total solar eclipse of August 19 was well observed at Berlin and other places in Europe. At Klin, near Moscow, it was cloudy, but an Astronomer, not to be put off, ascended above the clouds in a balloon and obtained a successful observation.

Chacornac has recorded many star changes, and declares that new stars appear, and old stars disappear, much more often than is suspected.

Allair, the leading brilliant in *Aquila*, has been thought to vary in lustre at times. It has a very sensible proper motion.

Maraldi, writing of the polar snows on Mars as far back as 1704, says they had then been occasionally seen for at least 50 years.

Amongst the valuable Astronomical information to be found in *Smith's Planetary Almanac* for 1888, there will be a Planetary Ephemeris written specially to suit amateur Astronomers, notes on eclipses, on the asteroids, etc. Price 12 cents, post paid. Prospectuses free. Every amateur Astronomer should have this book.

Previous to observing with the telescope, the eye is usually greatly benefited by a five minutes' rest in an utterly dark room.

Persons unacquainted with the use of the telescope imagine that very brilliant nights must of necessity be the best for "seeing." Experience would teach such that nights of the kind mentioned are often of very little value, especially for observations on the planets and double stars.

How many *Perseids* did you count on the evenings around St. Lawrence Night? I was at Melvin, N. H., at the time, and noticed quite a few, especially on the 7-8. According to Denning, there are two streams, having distinct radiant points, one near *Mu Perseus* and the other near *Epsilon* in the same constellation. August 6-12 is given as the period of these meteors' appearance. Occasional ones radiate from the same places in October and November.

The Jovian Satellites cease to be visible in the telescope after October 13 this year, owing to his then proximity to the sun. After the planet becomes a "morning star" the satellites reappear, being visible once more by December 1st.

Say your farewells to Venus as an "evening star." She is at "inferior conjunction" passing between the sun and earth on September 21st. Early in October those who rise before the sun will notice her in the eastern sky. Then will be the best time to observe, as the morning air is much less impregnated with foreign matter than the evening air. Do not be afraid of rising early, as the morning air is not injurious. As a proof, remember how many famous Astronomers have lived to a good old age.

The "Harvest" and "Hunter's" moons can only occur when the sun is in *Virgo* and *Libra*, when the moon "fulls" in *Pisces* and *Aries*, consequently the "Harvest Moon" this year is that which fulls on September 2nd, and the "Hunter's Moon" that which fulls on October 1st.

PHOTOGRAPHING THE HEAVENS.

I learn that the Congress at Paris decided on obtaining numerous views of the Moon, Planets and any comets that may appear prior to the close of its labors. These views will, doubtless, prove superior to most of the views we now have. As an instance of the importance of the work of the congress it is stated that, in a space where good star maps now show

about 170 stars, the methods of photography to be used will, it is expected, reveal in some places as many as 5,000, or more in one small map than the eye now can see in the whole heavens. About 20,000,000 stars will likely be revealed in all, exactly represented as to position and brightness. What an infinity is here! Think of it. There are no less than twenty million suns with, in all probability, similar functions to our own sun. Besides

"Other stellar systems, such as this Of which our mighty sun is but a speck. Clusters of whirling suns with reflect orbs Basking in their warm rays, and circling on Each in its proper round, appointed year."

Two thousand photographs are to be taken with a limited length of exposure, so that only stars down to about the eleventh magnitude will be shown, and two thousand additional photographs with a much longer exposure, so as to catch the faintest twinklers extant. Stars of the first magnitude are said to need an exposure of less than the hundredth part of a second to give a correct image, while those of the sixteenth magnitude need an exposure of 1 hour and 23 minutes. What would Hipparchus, who, over 2,000 years since, with much labor and pains, constructed the first imperfect chart, say to these things? Truly Astronomy is a progressive science.

NEW COMET.

Mr. William R. Brooks, at Redhouse Observatory, Phelps, N.Y., discovered a telescopic comet on the early morning of August 25th, in R. A. 8 hrs. 33 mins.; Dec. 29° N., or near *Iota Cancri*, and some 15° East of "The Twins," in the North-Eastern heavens. The comet's motion is easterly (toward the sun) and and its nucleus is described as "brightish." This discovery entitles Mr. Brooks to another Warner prize of \$100.

The Brooks' Comet must not be confounded with "the largest comet in many years," said to have been visible at Indianapolis on the night of August 24th "in the northern sky," with a "somewhat dim outline, but perfectly plain to the naked eye." Of it, there is, as yet, no verification. It may turn out to be either a new body, or it may have been only an auroral streamer.

ALBANY, August 31.—Prof. Egbert announces that in investigating the orbit of the comet recently found by Mr. Brooks, he has identified it as a return of the Olbers' comet of 1815.

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 IX. (Continued.)

A description of one of the most peculiar features of Martian existence is now in order. Beside those already named, there were—*lona-jide* members of the Am-Ram household, children of my host and hostess, relatives of the accomplished Myrina, eight others, working about the establishment much as servants do on earth—at various domestic and agricultural employments. These, although part of the family, did not eat their meals with the rest, in fact took no part in the general conversation, and were treated in every way as servants, not as children. I found that they even had no heirship with the rest, being accounted in Martian law mere goods or chattels, and capable of being hired out at will to others if necessary.

To explain this peculiar feature of Martian household economy, I have but to point my reader to that most industrious of insects—the bee. In the hive one finds three classes, or sexes if one may so express it, viz: the male, female and neuter. The neuter bees are pre-eminently the worker bees, are they not? So it is with the human neuters on Mars. It is their business to do the drudgery.

That afternoon, I remember, two of these neuters waited at table, and it was from their mother and sister, Morna and Myrina, that I gleaned the following items of interest concerning their class, its ways, peculiarities and habits.

Every Martian wife, I was told, bore her husband from ten to fourteen children. First, two or three girls—so as to ensure the continuance of the race—next, two or three boys, after which the capacity of the Martian mother for male or female child production appears to fail, and all succeeding children are sexless. That Martian boys and girls excel those of earth in genius, inventive ability, intelligence, and mental adaptability for art and science, cannot be gainsaid. And necessarily, since each one is destined to fill a post of importance, directing either a household or a number of neuters at their work in factory, house or field.

The neuters are devoid of every quality that has its springs in the well of affection. Lacking in intellect, they are docile to an extreme, remarkable for their endurance, and the toughness of their thews and sinews. They have absolutely no gallantry, are devoid of nearly all ambition, have very little

courtesy; aspiring to little more in life than the animal routine of eating, drinking, sleeping and working; undergoing fatigue and pursuing their occupations with a regularity and a continuity of purpose that accomplishes a great deal in a day. In short they are little more than living automata, deficient in brain development, totally failing in those portions representing parental affection, conjugal love and amativeness. "Hewers of wood and drawers of water," these neuters fill a similar position in the Martian domestic economy to that of late occupied by John Chinaman on the Pacific Coast. Every Martian house, even of moderate size is blessed with at least two or three, and heads of families too poor to retain all their neuter children—there are no absolute paupers on Mars—apprentice them to their richer neighbors, receiving in payment a sum fixed by the State.

With these physiological conditions obtaining, it is not to be wondered at that the men and women—the boys and girls even—of Mars, can impress a neuter servant with their wishes at the distance of a mile or more, so satisfactorily—the weaker mind carrying into effect the will of the stronger—that the veriest tittle of detail is carried out on the work in progress, exactly as the overseeing mind dictates.

If you ask me how do the Martian women bear the thought of rearing neuter children? I answer that what is natural, is usually agreed to. Again, the Martian matron looks upon her neuter offspring as necessary—and although she gives them the same care during infancy as she gives to her boys and girls, still her higher maternal love, knowing that it cannot be reciprocated, stays with the children who will reciprocate it, the female and male offspring invariably being the first-born.

At a cursory glance, the appearance of the neuter is not very much different to that of the sexes, except that a distinctive dress of a much less expensive material, is used. The carriage and bearing, too, is more methodical, plodding; more in fact like the gait of the agricultural class on Earth; not at all characterized by the quick step and lofty bearing of the Martians of either sex. The neuters are naturally very robust, stout, big boned, fleshy, much hardier in point of individual strength and muscular development than are the sexes. They attach themselves strongly, like our domestic animals, to the four walls of home, and its immediate surroundings; never seek to stray, but care very little who is master or mistress. When at work, a gang of five or six neuters is generally attended by a male or female overseer—very often of quite tender age whose mind is usually of sufficient power to impress and direct them all. As re-

gards obedience to orders and directions, the automata of the Vrilya, described by the late Lord Lytton, in no wise surpassed the neuters on Mars. In point of population, I was told that the neuters, at the time of which I speak, slightly outnumbered that of both the male and female population put together.

CHAPTER X.

THE STORY OF A WRECKED WORLD.

Seated at the table, which I must confess was rather high for me, and at which I had to be accommodated with an extra cushion on my chair, I had much pleasure in listening to a conversation with Madame Morna on the subject that forms the heading of this chapter.

"Some twenty-five millions of Martian years ago," the lady began "that is, in the early human history of this planet, another large orb existed between our orbit and Jupiter, with a revolutionary period of about four and a half earthly years. This planet, known in our Astronomical works as Sabrina, was attended by three moons, now known by your Earth Astronomers as the asteroids Ceres, Pallas and Vesta. At the time of which I speak, Sabrina was nearing opposition, and was well seen here at midnight. Beyond the planet, what was at first taken for the nebulous head of a comet was noticed, having almost the same Right Ascension and Declination as Sabrina. It soon became evident to our Astronomers that the new body, whatever it was, would encounter the planet, and if not turned aside would strike Mars as well. Our Astronomers declared the comet, or whatever it was, a new body, moving around the sun in an elongated orbit, and decided that if it were not dissipated by Sabrina, its course must at least be changed. Comets in those days, were not quite as well understood as they are now—and if not exactly objects of terror, were certainly looked upon with apprehension by us. We now hail them as public benefactors, because they serve electrically to quicken our poor dying planet, making its soil more productive and stimulating its energies, and the result, here, usually, is an excellent harvest.

"This new body, however, seemed to differ from most of its brethren, being unusually dense, shining quite brilliantly with reflected sunlight and hiding stars that it occulted. We noticed, as the conjunction drew nearer, that Sabrina became perturbed, its moons moved away into extraordinary orbits and then—the crisis came! It was not visible from one half of this planet, and thousands of persons travelled many miles to watch the effect of the conjunction—the foreign body, which was really an immense and very dense shower or cloud of meteors—some of them as large as Phobos and

Diemos—struck Sabrina, bursting it into a thousand fragments, whirling many of them away out of their old orbit. The meteors were nearly all impeded, and turned into planetoids themselves, or fused into portions of the disrupted world. A comparative few escaped, reached Mars, and the records of mischief done even by these stragglers is alarming. One, seven miles in diameter—composed principally of burning saltpetre—fell on one of our cities, buried it half a mile deep, and where that city existed, is to this day a salt, salt lake."

"Earth hath its counterpart in the Dead Sea and its tradition concerning Sodom and Gomorrah," I said.

"It has, but our disaster was much more serious than that, and occurred very many years before, ere the worst aërolites had been attracted out of space by the sun and larger planets."

"Your narrative," I said, "explains why our Astronomers are continually discovering new asteroids, 'pocket planets,' as some facetiously call them."

"Exactly," replied the mother of Myrina, "and will continue to discover so long as your world has an Astronomer. There are millions of those bodies, some of them not larger than an apple," (the Martian apples are almost as large as our water-melons,) "a few of the smaller are fragments of that dissipated world, but most of them are aërolites."

"Can you tell me whether or no that world at its dissolution was inhabited?"

"Alas! yes, but only partially. It was an infant world, and the sentient, thinking beings upon it comparatively few. Why, it is the fact of this catastrophe having occurred that has infused into every race in every inhabited world of the system, a nameless dread, accompanied by a terrible prediction, that the final scenes in the existence of each world are to be the result of an awful catastrophe."

"But how has the news spread from Mars to the Earth and other planets?"

"By wandering spirits."

"Then you consider our fears of a final conflagration and disruption ontirely without foundation?"

"Most certainly. The chances are not one in ten million for another such encounter in this system, and the death of your world will be similar to ours. It is destined to be frozen by degrees and its inhabitants starved. We die ages prior to you, however."

My spirit senses froze at the thought of such ghastly possibilities, but I replied not.

CHAPTER XI.

ERIEL NAVIGATION.

Deeply interested in such entertaining conversations, the meal—very abstemiously partaken of by all; I noticed—passed. The food of which I partook

was different to that of the rest, I being given specially prepared "Spirit Sustenance" such as is continually furnished to souls visiting Mars on their way to a final habitation. The food in question contained much electricity, that subtle fluid which some consider the basis of spiritual existence.

The Martians, not being carnivorous, live principally on grain and fruit, grain being the staple article in the North and South, and vegetables and fruit the common food nearer the tropics. Conversation, as will have been noticed, flowed freely, but notwithstanding its so doing, music, and that of the softest, sweetest nature, was permitted to diffuse itself through the apartment, not, however, with sufficient noise to distract attention from the questions under discussion. The melodies were changed at the will of our host, by his simply pressing various stops fixed at the side of the table near his hands. The table from which we dined, was in fact a musical one.

A short grace closed the meal. Myrina then suggested with a smile, that, as the day was waning it would be best for her to see me part of the way home."

"Willingly," I answered, "but how."

"Leave the means to me," she said, merrily; hastening at the same time from the room.

Having bowed my adieus to this interesting family, of whom I already felt almost a member, I began to exhibit premonitory symptoms of dissolution, when my fair Martian returned, clad in a different set of garments, selected, as I at once saw, for their combined warmth and lightness.

"Are you ready, Seybold?" I nodding my assent, she continued: "then let us go." We stepped out into the chill afternoon air and found before us an air-boat with steering apparatus, fixed to a moderate sized balloon, ready for unmooring. Two neuters were hauling on the cables. I stepped into the car, Myrina followed, and, bidding the servants let go the guy ropes, we waved our farewells, and, shooting upward, were soon a considerable distance above the ground. This not exactly suiting our wishes, my fair steerswoman, with a carefully timed manipulation of the gearing, caused her air-ship to cease rising. It then moved in a direction straight forward towards the sun, the place of our earth at the moment. Enchanted with such an easy mode of conveyance, I expressed my delight in a few words, when Myrina answered:

"All your attempts at aërial navigation on the Earth have hitherto failed, not so much on account of your excessive gravitation, but because of the strong wind currents in your atmosphere. Your world is not yet old enough for successful aërial work, and it will be centuries, probably ages, ere man will assert his

complete supremacy over the realms of air. Even here, on an inventive world *par excellence*, our mechanics and philosophers were for an immense time engaged in fashioning and deciding upon a perfect model of an air-boat such as this, to move at the desire of the aeronaut. Nor was it, indeed, until our air currents sufficiently stagnated, owing to the extreme age of our planet, that we were successful, in spite of all our toil. Even now, several days occur during the year when what you would consider but a moderate breeze obtains, yet we find it impossible to make ascents. But it is about time that we began to rise," she exclaimed, and, adjusting a respirator over her nostrils, to which an inflated air chamber was attached, my conductress gave our aërial steed its head, and we shot up to an enormous height. That is, an enormous height for Mars, but much lower than either Glaisher's or Tissandier's highest altitudes on Earth. At last, however, Myrina was reluctantly compelled to bid me farewell, and while my spirit sought the Earth, she, waving an adieu, directed her air-boat directly downward.

I reached the centre of attraction between the two worlds—felt myself rapidly falling, falling, until, with a sudden jerk—I awoke, and found myself once more in my observatory.

It now seemed about time for me to leave off doubting, and, as the affianced of one more than earthly, I walked about, filled with a joy that it were difficult to describe. I was like the dying saint, at the moment of dissolution, when he realized that even the most adventurous flights of his faith hitherto had but left him far short of the truth and the actual beatitude that accompany an approach to the realms of bliss.

I soon discovered that my ideas had become enlarged and improved, for I began to grieve over the many evils that I saw around, and strive to ameliorate them. But this, after a few attempts, only made me a subject for ridicule; my neighbors were not yet ready for Martian improvements, and the unlettered rustic inhabitants of Baconshire, very soon summed up the matter to their own satisfaction by whispering amongst themselves that the star-gazing "Maister Sobbold Melvin" was going crazy by reason of over study. This is usually the verdict passed upon the man that is ahead of his generation; the man that is not content to let other people do his thinking for him; who thinks for himself, and in so doing is prone to depart somewhat widely at times from the beaten track, whereon the multitude, tied hand and foot, hedged in by the bonds of custom, are compelled to traverse a monotonous dead-level of mediocre thought from the cradle to the grave.

(To be Continued.)



Weather Forecast.

SEPTEMBER, 1887.

The season of "mists and mellow fruitfulness" is almost upon us, and farmers in northern sections are anxious to know what kind of a month September will be, especially those who have to house their crops, or who wish to sow their Fall seed, or take their wives and daughters to the Fall fairs. In the cities and at the Summer resorts, where residents and guests are fully alive to the fact that Smith forecast a hot, dry Summer and did not make any mistake either, the people are also anxious to know what September has in store. Taking the month as a whole, I would be inclined to call it a favorable one; take it in sections and it might deserve a different appellation. Anyway, the atmospheric disturbances will not likely be equal to those of many of the Septembers of the past. Western sections will likely be troubled by prairie and forest fires. The rainfall, taken as a whole, promises to be heavier than usual. To admit of this, there must be considerable unsettled weather, which will occur during four or five "general storm periods," whose dates I have located below. In the extreme West and North-West, where the corn and wheat are not yet harvested, the yield will be heavier than is at present (August 15th,) anticipated.

An extended forecast follows:—

Sept. 1 to 3:—Month opens warm and showery.

Sept. 4 to 10:—Cool, cloudy, showery and Fall-like, high winds—warmer, fine and mild for the season—End of week unsettled and stormy—Local frosts.

Sept. 11 to 17:—Local frosts—Showery, cool and cloudy—Warm weather, some thick fogs in places—Quite a hot spell, especially in southern sections—Thunder storms and high winds.

Sept. 18 to 24:—Stormy, unsettled—Warm to hot weather for September—Generally windy and rainy—Equinoctial

gales probable, especially on Lakes and Atlantic Coast—Hail and thunder storms in southern sections.

Sept. 25 to 30:—Cooler weather—Some heavy rains and murky weather—Stormy again over the Lakes and Atlantic.

NOTES.

My "General Forecast" for the year 1888 will be first published in *Smith's Planetary Almanac*, to be ready in November. Friends would greatly oblige me by spreading this book. Prospectuses free on application.

What do the people of Illinois, Indiana, Iowa and the southern portion of Michigan and Wisconsin think of my Summer "drought" forecast by this time?

Cool terms in August, after periods of excessive heat, are not of necessity to be taken as harbingers of coming Winter. On the contrary, they show that Nature is taking a short rest, preparatory to more hot weather. If the cool reactions did not appear, then we might reasonably look for an early setting in of Winter.

Fall ploughing is now in order. With regard to Winter wheat, I fear that the heavy thaws and general breaks-up which I anticipate during the Winter of 1887-8 will be the means of so exposing the ground to the cold snaps that follow thaws as naturally as Winter follows Summer, that a good deal of grain will be found next Spring to have been "Winter killed."

The first snow storm of any consequence seems likely this Fall during the third week of November.

Wintry weather generally at the close of November this year.

Some marked periods of warm to hot weather during September.

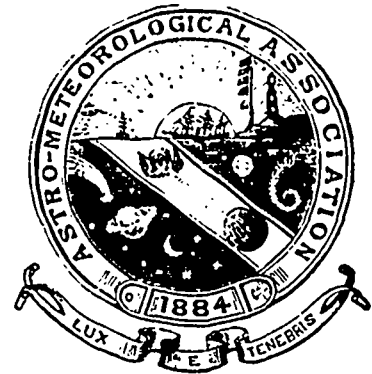
Frosty mornings will be more numerous than usual this October.

At present, December looks like ending up mild in the East and cold in the North-West.

The Winter of 1887-8 will be similar to the Winters of— but I am anticipating. For this information see my *Planetary Almanac and Weather Guide*, ready early in November.

"The Canada weather prophet is not so much off the track, as some suppose, as the drought predicted last Spring, was not universal. If we remember rightly, it was to be general, and when we look over the whole United States, we find the heavy rainfalls confined to much less than one-fourth, while there has been, in many and extensive sections, extreme drought and heavy loss of crops therefrom."—*Democrat, Doylestown, Pa.*

[Eastern Pennsylvania happened to strike the "excessive rains" I talked of. No wonder the people there disbelieve in my "drought." But both happened, exactly as forecast.—W.H.S.]



Association.

A list of officers and other interesting reading matter relating to the Astro-Meteorological Association will be found in *Smith's Planetary Almanac* for 1888. Original essays from well known Associates will also be a feature. I shall be pleased to forward prospectuses post free for distribution on application.

Associate Birt, of Utica, N. Y., has recently purchased a first class refracting telescope with a 4 inch objective and eye pieces with powers of from 50 to 300.

One of the most prosperous and useful sessions of the Central Committee is believed to be now opening. Many papers of very great interest have been read at previous meetings, but it is expected that even more interesting ones will be forthcoming this session. In this connection I think the usefulness of the Association would be extended were a greater number of associates to prepare papers, or at least notes, to be read at meetings. Everyone must at times have seen or read of some natural occurrence, astronomical, meteorological, etc., which they would like to know more about. Discussion, which is brought on by such readings will accomplish this. Again, we want larger audiences. Giving in one's name as an associate and paying one's fees are not the only duties of membership. Common courtesy demands that we attend meetings. Not to attend, without sufficient reason for absence, is, I take it, simply slighting our fellow associates.

GEORGE JOHN BOWLES.

GEORGE JOHN BOWLES, A.M.A., E.S.O., was born in Quebec city in 1837, where he was for nearly twenty years connected with the Provident Savings Bank. He came to Montreal in 1872 and entered the British American Bank Note Company, ably filling the responsible position of Secretary-Treasurer until his demise, July 16, 1887. An ardent student of science, Mr. Bowles early expressed sympathy with the work of the Astro-Meteorological Association, being elected an associate in 1885, at the February

meeting. His devotion to Astronomy, prior to this, had led him to undertake the construction of an 8½ inch silvered glass reflecting telescope, the mirror and diagonal of which he purchased from Brashear, of Pittsburgh, and obtained the eye-pieces from England. The mountings were made under his own supervision, in Montreal, and a magnificent instrument was the result. I remember that the views of Saturn obtained on one or two occasions, when I had the pleasure of using the telescope, were particularly fine. But it was as an entomologist that he became best known. Instrumental in forming a branch of the Entomological Society of Ontario at Quebec on July 7, 1864, he was unanimously elected its first Secretary, holding the office until that Branch broke up. After removing to Montreal, Mr. Bowles immediately identified himself with the work of the Branch here. Becoming a member about the close of 1873, he was elected Vice-President of the Montreal Branch of the Entomological Society of Ontario, May 6, 1874, and President on May 4, 1875, when his opening address proved a masterpiece of composition. He continued to fill the position until May 10, 1881, when he willingly took the less honorable post of Secretary, owing to the departure of the then Secretary to the United States. Retaining the Secretaryship until May 8, 1883, he was then re-elected President, continuing in the office with one year's intermission as Vice-President, until he died. His writings on entomological subjects are well and extensively known, and most of his essays have been printed in journals devoted to that science. He is said to have been the first to have called public attention to the introduction of the Common White Cabbage Butterfly, (*Pieris Rapae*), into America in 1864, by a paper read at Quebec, where some cabbages had been thrown on the wharf out of a vessel recently from Europe, from whence the "Cabbage Worms" have spread over the whole Continent. Other noted papers from his pen were: "On the Causes of the Scarcity of Insects;" "On the Noctuidæ Common to Norway and North America;"—specially interesting to Meteorologists and students of Climatology; "List of the Noctuidæ of Quebec Province," etc., etc. His correspondence was naturally with some of the leading entomologists, amongst others Scudder, Lintner and Henry Edwardes, besides other well known Lepidopterists, with whom he exchanged letters and specimens until his general collection grew to be one of the finest in Canada. For some time ailing, owing to kidney trouble, Mr. Bowles visited England about a year ago and obtained the most eminent advice, securing however, but temporary relief. His loss is a loss to science.

REVIEW.

Tornadoes: What they are and how to observe them; with practical suggestions for the protection of life and property. By John P. Finley, M.S., F.S.Sc., Lieut. Signal Corps U. S. Army, etc., 1 vol., 196 pp. New York, 1887: C. C. Hine, Insurance Publisher, 137 Broadway.

The settlement in recent years of the fertile Western and South Western States had brought the residents of this continent into such alarmingly frequent contact with the disastrous funnel shaped cloud, that a work of this nature was an imperative necessity. For it is not as an historical work that the book is of most value, albeit the records are, many of them, of great interest, but rather as a guide in future cases to the inhabitants of the devastated districts. "For," says the author: "The populous region of the United States is forever doomed to the devastation of the tornado. As certain as that night follows day is the coming of the funnel shaped cloud. So long as the sun shines upon the vast regions in the Mississippi and Missouri Valleys, there will forever occur these atmospheric conditions which terminate in the destructive violence of the tornado." Not only in the West, for, according to the full and carefully prepared tables in the work, one finds that of 1,867 tornadoes recorded since 1682, 67 were in New York, 61 in Pennsylvania, 22 in Massachusetts, 13 in Connecticut, 12 in New Jersey, 8 in New Hampshire, 7 in Maine, 4 in Vermont, and 1 in Rhode Island. Even this country has experienced their fury at intervals. The work is well printed in "old style" type; price, \$1.00, bound in cloth; has numerous illustrations, some of them from photographs of tornado wrecks, as well as special charts, elucidating the text. The suggestions for constructing tornado caves as places of refuge are very interesting and explicit, as is also the "scientific résumé of tornado characteristics." Lieut. Finley's work is also of such value to the meteorologist that very few would care to miss reading it. It will also, doubtless, prove the basis of future works on this important subject, which, owing to the devastation caused by tornadoes, is one of the most interesting known to meteorology.

The New Jersey Weather Chronicle is a neat four-page monthly, about the size of ASTRONOMY AND METEOROLOGY, "published in connection with the New Jersey State Weather Service, for the benefit of co-operating observers" at New Brunswick, N. J. Besides a weather bulletin for June, the July number contains well written articles on "Fog Predictions for the Banks of Newfoundland," by Sergeant E. B. Garriott, and "The New York World's Balloon Voyage," by H. Allen Hazen.

Meteorology.

RECENT BALLOON ASCENSIONS.

Following close on the recent ascension in the United States comes the news of what is said to have been a most successful ascent at Paris on August 13th, when Capt. Paul Jones and M. Mallet left *terra firma* in the balloon "Horta," inflated under the auspices of the Paris *Figaro*. The start was made at 7 a.m., a very much more favorable hour than those at which ascents are usually made in this country, where it is generally late in the afternoon, ere the balloon gets away, and night comes on at once, decreasing the buoyancy of the gas and sending the balloon to earth. In Europe, however, it is the interests of science that are consulted in such cases, and not those of the public. At the start, the balloon rose so rapidly that it became invisible in twenty-five minutes. It descended the same afternoon in Belgium, after passing an altitude of 7,000 metres, or about 22,000 feet. M. Mallet was twice insensible. The object of the ascension was to ascertain the height at which human life can be sustained. Other memorable ascensions are recalled by this. On September 5, 1862, Glaisher and Coxwell ascended at Wolverhampton, Eng., to the height of 29,000 feet, when Mr. Glaisher became insensible. It is said that the highest point reached was some 37,000 feet, or 7 miles. On April 15, 1875, Sivel ascended at Paris, with Tissandier and Spinelli. At the height of 22,000 feet Tissandier fainted. On reviving, one hour later, he found the balloon descending and his two companions dead. The altitude then reached, as indicated, by a self-registering barometer, was about 8 miles.

SIGNAL SERVICE PROBABILITIES.

Lieut. Ireland, in answer to the request in last issue for an account of the way in which the "Weather Probabilities" are prepared, sends the following

When observers are required to make predictions from observations taken at a single point, as a rule, the predictions are erroneous; but a number of observers making observations at a given time, and telegraphing them to a central point to an "indications officer," (who will deduct certain conclusions from these observations) the observers are generally given the credit of making the predictions. The predictions really are made by the "indications officer" to suit the different localities in his district. Thus Baltimore, Md., Lynchburg, Danville, Richmond and Chincoteague, Va., as well as numerous other stations in this district report to Washington, D.C., the reading of the barometer, range and

reading of the thermometer (wet and dry bulb), dewpoint, mean humidity, direction and force of the wind and clouds and appearance of the face of the sky. From these, with a thorough (?) knowledge of the laws of storms, the officer is enabled to predict, with tolerable accuracy what will be the condition of the weather for the ensuing twenty-four hours. And, as telegraphic messages can travel with such lightning rapidity, the officers of the signal service can be kept informed as to different changes in the weather and issue bulletins accordingly.

St. Louis, Washington, San Francisco, Boston and St. Paul, and other cities, are centres from which bulletins are issued in the United States. In Canada, Toronto.

[According to Ben. Perley Poore, the earliest Weather Reports on this Continent were inaugurated about 1852 by A. H. Stephens, then a representative from Georgia at Washington, who was well acquainted with Espy, the meteorologist. Stephens suggested daily telegraphic reports, and Espy approved; agreeing to enquire whether the telegraph companies would furnish reports free. Stephens agreed to see Col. Seaton, of the *National Intelligencer*, and ask him to publish the reports as news items, free. All that was asked was granted, and from this, the present far-reaching system originated.—W. H. S.]

Southern New England suffered from terrible rain storms and cloud bursts this July. Waters were very high, dams burst, places were flooded and in one or two instances people drowned. "Limited areas will suffer from excessive rains," said my Summer forecast, and "streaks of heavy rainfall in places, "my probabilities for July.

The month of April, 1887, in Canada, was remarkable for the number and severity of the storms which passed over the eastern section, also for the storms of the 28-29 in the Lake region. The average atmospheric pressure was above the normal at almost all stations East of Lake Ontario. From Lake Ontario to the Rockies it was below. The average temperature was below the normal in Ontario, Quebec and New Brunswick, but slightly above along the Atlantic coast of Nova Scotia, in Manitoba and the North-West. In British Columbia it was below normal. Canada's minimum thermometer reading during April, 1887, was—26° below zero at Hillview, Man., on 2nd. The maximum reading was 90°, at Sourisford and St. Albans, Man., on the 29th and 30th respectively.

May, 1887, in Canada, was remarkable for fine, dry and warm weather; in Ontario and Quebec, also, for the absence of high winds from the Lakes to the Atlantic. The average temperature was above the normal at all stations. Light rainfall. During the first three weeks the

crops suffered from drought and hot sunshine. Of 510 predictions issued by the Toronto office during May, 447 were fully verified. The maximum reading was 95° at Glichen on the 30th, and the minimum 12° at Savauno on the 4th.

June in Canada gave a temperature above the normal in Ontario, Quebec, Northern New Brunswick and Manitoba. In British Columbia and the Rocky Mountain region it was below the normal. The highest temperature of the month (94°5') occurred on the 15th at St. Albans, Man., and the lowest, (26°4') on the 3rd, at Swift Current, Assiniboia. Of 543 predictions issued by the Toronto office 425 were fully verified.

July, 1887, at Montreal, gave a mean temperature of 73°48' as compared with 69°19', the mean of the past 13 years. The maximum temperature was 90°4' on 4; minimum 56°3' on 14, a range of 34°1'. Rain fell on 16 days to the extent of 2.66 inches, as compared with a mean July rainfall of 4.25 inches. Pretty hot and pretty dry, eh? The mean temperature is the greatest monthly mean in the past 13 years, and the rainfall is the smallest for the month of July for the same period. Highest barometer reading 30.169 on 24, lowest 29.502 on 10, or a range of 0.667 inches.

Mr. Parker reports from New Brunswick my forecasts for July verified. The month entered with temperatures running up to the nineties, with thunder storms for several days in succession. Large hail in sections and high winds that blew down barns and moved heavy buildings. uncommonly cool for the time of year 11 to 15. Six inches of rain fell between the 1st and the 18th.

The average temperature at Oshkosh, Wis., for the first 12 days of July, 1887, was 91°. In 1886 it was 87° and in 1885, 84°.

The "relative humidity" on May 11-12 was remarkable at Nashua, N.H., when the dryness was such that the cotton in the Jackson Company's mills became highly electrified, to an extent unknown except in very dry, windy days in Winter. The trouble was great, causing as it did, the cotton to adhere to the cards, until steam was discharged into the room.

In Minnesota, Mr. Brandenburgh's report shows June to have been noticeable for its abnormally high temperatures and for deficiency of precipitation in western counties. A frost on the 23rd did a little damage. The mean temperature for the State was 68°3' or 2°9' above 1886 and 4°2' above 1885. The minimum temperature of the month was registered on the 4-5 at Grand Forks and Pokegama Falls, where it was 32°. Frosts went as low as the 43rd parallel. Precipitation was greatly deficient.

When it is 85° in the shade "by standard thermometer" it is usually

about 140 in the sun on the pavements.

A tornado and hailstorm swept parts of Hughes and Sully Counties, Dak., on July 11.

Experts estimate this year's United States cotton crop at 7,500,000 bales, and value it at \$300,000,000. This is \$75,000,000 below the value of the annual hay crop of that country, \$50,000,000 less than the average wheat crop and \$340,000,000 below the average corn crop.

New England was visited by another very heavy rain storm on August 18, which caused washouts on several railways.

London, Eng., was struck by a terrific storm on August 17. Three persons were killed.

Nova Scotia has suffered, like a great many other places, from extreme heat and prolonged drought.

Mr. Simmons sends the following temperatures from Charleston, S. C.: July 11, maximum 96°; 13, 92°; 14, 95°; 15, 96°; 17, 97°; 18, 102°; 19, 96°; 20, 96°; 21, 93° and 22, 96°.

Mr. Moore reports June at Charleston a remarkable month, entering cool, with local showers to 10th, after which it turned dry for 15 days and the longer the drought continued the hotter it got until it nearly parched up the corn. From June 25 to end it was cooler, with rains, July opening cool and showery. Two earthquake shocks in June. Up to July 6, cool and showery, after which it grew warmer, the drought again coming on and getting worse and worse until the 24th, some days proving still and very sultry, "deadening hot by day and suffocating at night," the thermometer registering for seven consecutive days from 97° to 99° in the shade. A great many persons and animals were sunstruck and several died. On the 24th a terrific thunder storm occurred, the thermometer registering 92° at midnight. After the rain, the next evening (25) proved cool and Fall like.

Mr. Birt reports July hot at Utica, N.Y. Maximum, 103°, minimum 40°; mean 71°82'. Maximum barometer, 29°64', minimum 29°10'; mean 29°484. Five electrical storms, one on the 30th proving remarkable for the quantity of electrical manifestations.

At Philadelphia, July 16 gave a temperature of 102°, the hottest with one exception for over 30 years. Thirty cases of sunstroke that day.

At Glasgow, Scotland, the heat during June 1887 was phenomenal, not having been surpassed for over 25 years. On June 25 it was 82°7' in the shade and 133°2' in the sun.

The infant mortality during the heated terms this Summer, in the cities, has been appalling. Parents on the approach of hot weather, should make every effort to remove their little ones to cooler quarters.

Mr. Wood reports from Shawano, Wis., July, 1887, to have been the hottest July in 20 years there. Comparative mean temperature as follows: 86°13' in 1887; 84°17' in 1886; 83°18' in 1885, and 80°11' in 1884. Min. 73° on 14th; max. 99° on 15th. The lowest and highest noon record was consequently on the 14th and 15th. Comparative July rainfall 2½ inches in 1887; 1 inch in 1886; 4½ inches in 1885 and 7½ inches in 1884. Some 40 miles South where an unusual drouth has prevailed for several months the mean for the month was 90°.

Prof. Forbes, Illinois State Entomologist, predicts lots of chinch bugs next Summer.

Thousands of dollars damage was done by a storm in West Virginia on the evening of July 20.

Baltimore was visited by violent storms on July 18-19. Houses were unroofed.

July 17 proved to be the hottest day in Toronto, Ont., for several years, the thermometer ranging from 97° to 104° in the shade.

New York Bay experienced a tornado on July 15. Great damage was done at Brooklyn.

Kingston, Ont., and neighborhood, was ravaged by a storm of great severity on July 16. Hailstones of great size fell and houses were unroofed.

At Joliet, Ill., on July 17 it was 113° in the shade. Fourteen convicts in the state prison were overcome by the heat and two died.

Mr. Horne reports from New Hampshire that July was very hot, with heavy precipitation. Farmers were put to considerable straits to save their hay. As it was there was a good deal spoiled.

The United States Signal Service has adopted two new storm signals. All they have to do now is to hoist them at the proper times.

Disastrous forest fires have ravaged Cape Breton, N.S. One hundred square miles has been devastated. There has also been a water famine there.

A cyclone was felt over part of the South of France on August 16. Several persons were killed.

Crops along the lower St. Lawrence, from Levis to Dalhousie, have suffered seriously from drouth.

Terrific heat was recorded over the United States on July 17, where temperatures of over 100° in the shade were the rule. Fifty-eight cases of sunstroke were reported that day at Chicago alone, where the thermometer registered 104°. At St. Louis the temperature was the same and 11 cases of sunstroke were reported. At Louisville, Ky., 8 fatal cases, at New York 9 cases, Philadelphia 18 deaths and Richmond, Va., 6 deaths. South Carolina and Georgia also suffered.

Wheelock, W. Va., reported continuous heavy storms during the first ten days of June. So much wet weather not known in June for a dozen years. This was one of the "streaks of rain" anticipated.

A tornado formed about 10 miles West of Salina, Kans., on June 8. At least one dwelling was destroyed.

Severe shocks of earthquake occurred in Turkestan during the second week of June.

A very heavy thunderstorm caused serious washouts in the neighborhood of Abercorn, Que., on June 3rd. The storm only extended over a narrow strip. My forecast read, "fine, hot weather, too dry in places, frequent thunder storms in others."

The rainfall during April, this year, varied considerably over the Dominion. In Manitoba, E. and N.E. Ontario, Quebec, Nova Scotia and Prince Edward's Island, it slightly exceeded the average. In other parts it was in deficit.

The Canadian Meteorological Service issued 561 predictions during April this year, of which 407 were fully verified, or 72.5 per cent.

The Minnesota Signal Service is pursuing a series of investigations upon thunder storms.

At Prince Albert, N.W.T., on May 13, nearly a foot of snow fell. Garden truck, then far advanced, was quite covered up.

The hottest day in the history of Milwaukee, Wis., occurred on July 16, when 100° in the shade was reached. There had previously been a long period of hot, dry weather. Three deaths from sunstroke were reported. One more link in my correct forecast chain. Milwaukee's previous very hot days were: August 5, 1881, 96½°; August 4, 1881, 95½°; July 16 and 17, 1878, 95°; July 25 and 28, 1886, 95°.

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cost in cents. Every one needs a copy. Issue for 1888 ready early in November, 1887. Price 12c. by post. Reductions on quantities. Price lists free. Dealers should apply direct to Walter H. Smith, 31 Arcade Street, Montreal, Canada, as no wholesale agents are appointed.

Correspondence.

All letters should be addressed—"Walter H. Smith, 31 Arcade Street, Montreal, Canada." For a personal reply enclose stamp.

PLANETARY INFLUENCES NO MYTH.

[26.] Enclosed please find \$1.00 for my subscription to *ASTRONOMY AND METEOROLOGY*. I am very highly impressed with the publication and wish you and it every success. There is no doubt in my mind but that planetary influence predominates to a great extent in our weather conditions, and exercises vaster powers than many imagine, not only over the weather, but the conditions of life, seismic movements, etc.

Ottawa.

H. B. S.

WILL ATMOSPHERIC CONCUSSION DESTROY LIFE GERMS?

[27.] I have heard it stated as a fact that if eggs are carried into a blacksmith's shop and placed near an anvil when work is going on, the eggs will not hatch out. The theory is that the jarring of the anvil injures the germ. I have never tested this, but have noticed in seasons when this locality has had much electrical disturbances and violent thunder storms, frequent and heavy; that my cabbage crop has suffered much less from insects. If so, might not some such effect be produced by the discharge of cannon in fields where insects are depositing their eggs? After an insect is hatched, unless it was fired out of a cannon, the concussion would likely have little effect on it. Please tell me if you think I have grounds for this idea.

Charleston, S. C. H. M. SIMMONS.

Ans.—This question was submitted to Mr. F. B. Caulfield, a well known entomologist of this city. He remarked: "I believe there may be something in it. It is a well known fact that severe thunder storms kill the germs in the eggs of birds. I never heard of the anvil theory before, which is very ingenious. If it could be proved true, it might be made of great use. Experiments, if tried, would be watched with interest."

RECOMMENDING ITSELF WELL.

[28.] Your *Almanac* is recommending itself well here. Its announcement of "a decidedly cooler change" recently, came up precisely on time, there being frost reported from various parts of this State. Along the low levels some of the most tender plants were nipped.

Virginia.

L. J. H.

HOPES IT WILL SUCCEED.

[29.] Enclosed please find \$2.00 for copies of *ASTRONOMY AND METEOROLOGY*. We are well pleased with it and hope you will succeed in getting the amount required.

Magog, Que.

(Mrs.) E. L. C.

CORRECT OUT IN MINNESOTA.

[30.] "Stormy, unsettled, high winds and gales—cool with rains," so says your forecast for May 29 31. It was correct as far as this place is concerned. On the 29th we had two hail, rain and thunder showers, with strong wind. On the 30th it was cold, rainy and windy, so cool that I had to kindle a fire in my sitting room. Enclosed find \$1.00 for another copy of ASTRONOMY AND METEOROLOGY. I will get more subscribers if I can, for I am anxious to have the paper succeed.
Hamlin, Minn. C. B. M.

WHY IT IS WARMEST IN THE NORTHERN HEMISPHERE WHEN SOL IS AT APOGEE.

[31.] If all heat is received from the Sun, why doesn't it become colder as we recede? The nearer we approach the Sun the colder it becomes. Why?
Utica, N.Y. BIRT.

Ans.—What you say is only true of the Northern Hemisphere. In the Southern, the weather grows hotter as the earth approaches perihelion, which it arrives at about Jan. 1 each year. When the Earth is at Aphelion (farthest from the Sun) the summer of the Northern Hemisphere occurs, simply because the Northern Hemisphere at that time (July 1) is turned towards the Sun.

NOT TOO OLD TO APPRECIATE THE PAPER.

[32.] Although nearly seventy years of age, I am not too old to appreciate and feel greatly interested in your work. Your new and interesting paper I like very much and enclose \$3.00, with subscribers' names. I will do all I can to help ASTRONOMY AND METEOROLOGY along.
Baden, Mo. O. F. D.

JUST SPLENDID.

[33.] ASTRONOMY AND METEOROLOGY is splendid and should have a large circulation among all people of observation with a weather eye towards the sciences pertaining to the rolling orbs around us. One almost feels envious in reading your cozy times with Myrina up on Mars. It looks as though it might tend to a celestial wedding in the spirit world and I send congratulations in advance.
W.

STANDARD WORKS ON ASTRONOMY, METEOROLOGY AND ENTOMOLOGY.

[34.] Would you kindly suggest what you consider (1) the best works on the sciences of Astronomy and Meteorology. (2) As you are something of an Entomologist, perhaps you could suggest works in that line also, for a public library.
Minnesota. LIBRARIAN.

Ans.—(1) Loomis' "History of Astronomy," said to be the best work of the kind in the language; Arago's "Popular Astronomy" (English version); Narrien's "Origin and Progress of Astronomy"; Guillemin's "The Heavens";

Herschel's "Outlines of Astronomy"; Gillet and Rolfe's "The Heavens Above"; all Flammarion's translated works and all of Proctor's Astronomical books. Special subjects: Nasmith and Carpenter's "Moon," Pingre's "Cometography," (translated), Proctor's "Saturn," and, as a guide to the amateur observer, Webb's "Celestial Objects for Common Telescopes." I may add that every person interested in this science, no matter how many works he has read, finds it absolutely necessary to keep up with new discoveries and discussions, by perusing the current literature published by such bodies as the Astronomical sections of the B.A.A.S., A.A.A.S., Brit. Astro. Soc., Trans. of the Royal Societies of London, Edinburgh and Dublin, indeed he may find something he did not know before in the modest little ASTRONOMY AND METEOROLOGY, with its verbatim accounts of the proceedings of the Astro-Meteorological Association. For Physical Astronomy Laplace's "Mecanique Celeste," (translated by Bowditch), For History, Whewell's "History of the Inductive Sciences." Concerning Meteorology, the list is smaller. Some of the best works are: Ferrol "On the motions of Fluids and Solids, relative to the Earth's surface," (New York, 1860). Espy's "Philosophy of Storms" and "Fourth Report on Meteorology," (Washington, 1857). Drew's "Meteorology"; Herschel's "Meteorology"; Dove "On the Distribution of Heat on the Surface of the Globe"—very interesting, with charts of the world, the temperature for each month, year, etc.; Scott's "Elementary Meteorology"; Finlay's "Tornadoes" and the "U. S. Army Met. Register" for 1855, (if obtainable,) which gives elaborate charts of temperature and rainfall. (2) Mr. Caulfield, Secretary of the Entomological Society here, suggests the following: "Packard's Guide to the Study of Insects," also, (same author), "Half Hours with Insects"; Harris' "Insects Injurious to Vegetation"; Woods' "Insects Abroad"; Edwardes' "Butterflies of North America" (now being published in parts); Scudder's "Butterflies of New England" (in preparation) and Saunders' "Fruit Insects." Popular journals are: "Entomologica Americana," (Brooklyn, N. Y.) and "Canadian Entomologist," (London, Ontario).

Planetary Influence.

Some imagine that the word "Astro-Meteorology" is simply an abbreviation of "Astronomy" and "Meteorology." Nothing of the kind. Astro-Meteorology is a distinct science. To become an expert in it, I grant, the student needs a thorough knowledge of the two sciences in question, in fact, one cannot be a good

Astro-Meteorologist unless one is also an Astronomer and a Meteorologist.

Ogilvie and Worcester in their dictionaries show this, the word being derived from "astron," a star, "meteoros," lofty, and "logos," a discourse; actually, "The art of foretelling the weather from the aspects (and positions) of the moon and stars, (planets)." Astro-Meteorology is, therefore, an endeavor to trace the connection between weather changes, storms, earthquakes and seasons of hot, cool and warm temperatures with astronomical phenomena. The endeavor is usually successful.

Truly, there can be no loftier study than this, with its grand possibilities and its many bearings on civilization. In fact it is too lofty for the greater part of mankind, who cannot trace up the effect to the cause, and are, in consequence, content to record the cause alone, hoping that in some future time enough records will have been piled away on their shelves to admit of a scientific forecast being made from such musty hoards. That the keeping of weather records should not be despised, I admit, but I cannot help but remark that by so doing alone no man will be able to step boldly forth and say, "such and such atmospheric changes or disturbances will take place on such a day." To do this Astro-Meteorology has to be resorted to.

Let me ask here, what has become of the numerous so-called predictive weather sciences that have arisen, apart from Astro-Meteorology? What has become of them? Why their names must have been written on the ever varying clouds which their inventors claimed to have learned to control. But Astro-Meteorology, on the contrary, has flourished—yes, flourished from the remotest ages; in fact we cannot go back to the days when it had not its students. Watching with the Chaldeans and Egyptians, observing with the most learned of the Greeks, making its home with some of the mightiest sages and scientists of later times, its students still study and record, frequently making forecasts at which a world marvels.

"Watching for coincidences," is admitted, even by our opponents, to be admissible in building up a scientific superstructure. We believe that we already are in possession of these coincidences, at least in sufficient number to admit of an Astro-Meteorologist, who has thoroughly studied his subject, making such reliable forecasts as the London Times in 1878 declared—could such knowledge be obtained—"would confer an incalculable benefit upon the people." The Astro-Meteorologist aims to confer that benefit, but in so doing, like many another public benefactor, derision and scoffing are meted out to him in no measured quantity by the very persons he hopes to benefit.