sults of the analyses of the Bergen Hill pectolite than any yet proposed. As written here, its relations to that of spodumene are to be noticed, as also to those of Wollastonite and pyroxene. The latter connection will be made plainer by writing the formula of pectolite thus:

$$\dot{R}^3 \ddot{S}i^2,$$

$\dot{R}$ being $(\dot{C}a\frac{4}{6} + \dot{N}a\frac{1}{6} + \dot{H}\frac{1}{6})$.

Northampton, Mass., Feb. 1859.

ART. XX.—*Notes on the Ancient Vegetation of North America*: by Dr. J. S. NEWBERRY. In a letter to Prof. DANA, dated Santa Fe, New Mexico, Oct. 15th, 1859.

Dear Sir:—I have just returned to Santa Fe after an absence of three months, spent in an examination of the geological structure of the country bordering the San Juan and Upper Colorado rivers, in Utah and New Mexico, connected with the War Department topographical survey under Capt. Macomb, Topog. Engrs.

The region visited proved interesting in many respects—beautifully picturesque and unexpectedly productive—covered with ruins, and once densely populated by a race that has now entirely abandoned it.

I would cheerfully give you a sketch of its remarkable physical and geological structure, but the results of the expedition will doubtless be published in detail by the War Department, and it is not proper that any part of them should now be given to the public. I will say however, in general, that our field of exploration includes an immense labyrinth of great cañons, scarcely less abysmal than those of the Lower Colorado in which we were last year involved—some of which are over a mile in depth—and even more varied and wonderful in character. The sections exposed in their walls permitted me to measure and examine all the strata between the base of the Carboniferous and the summit of the Cretaceous series; the latter formation attaining a thickness of 4000 feet, and occupying an immense area west of the main divide of the Rocky Mountains.

Our work this season connected on the south with that of the party with which I was associated last year under Lieut. Ives, T. E.—and combining the results of both expeditions, I have now a complete and detailed section of all the rocks composing the great central plateau of the continent, from the base of the palæozoic series to the summit of the Cretaceous. These strata are conformable throughout, and over 10,000 feet in thickness.

The collection of fossils made, both animal and vegetable, is quite large, and, with considerable new matter, includes what is much better, many well known species of which the geographical range will be seen to be much greater than has been heretofore supposed.

I was agreeably surprised to find here on my arrival, the May, July and Sept. numbers of the Journal, published during my absence, by which I have been in a degree placed *au courant des affaires scientifiques*. In the articles in the July number from the pen of my friend Mr. Lesquereux, I have been much interested, as they refer to matters which have engaged much of my attention for some years. In the letter of Prof. Heer there is however a passage which seems to me to require notice; although, situated as I am, without specimens or books for reference, I am scarcely prepared to take up the discussion of the questions involved in it. This is the less necessary now, as what I have to say in reference to them will be found *in extenso* in the reports on the geology of the country west of the Mississippi which I have made or have in preparation for the general government.

The paragraph to which I allude is as follows:—

"Your views of the gradation of the flora of North America agree perfectly with what we find in Europe. This led me to believe that the plants of Nebraska belong to the tertiary and not to the cretaceous formation. It is true that I have seen only some drawings which were sent to me by Messrs. Hayden and Meek; but they are all tertiary types. The supposed *Credneria* is very like *Populus Leuce*, Ung., of the lower Miocene, and the *Ettinghausiana* seems hardly rightly determined. Besides it is a genus badly founded, and which has as yet no value. All the other plants mentioned by Dr. Newberry belong to genera that are represented in the Tertiary and not in the Cretaceous. And it is very improbable that in America the cretaceous flora has had the characteristic plants of the tertiary; and this would be the case if these plants did belong to the Cretaceous."

It will be seen that Prof. Heer in this paragraph makes several distinct statements, which for the sake of brevity, I will notice in the order in which they occur. They are,

1st. That the fossil plant I supposed to be a *Credneria* is very like *Populus leuce*, Ung.

2d. The *Ettingshausenia* (called erroneously *Ettinghausiana*) is wrongly determined.

3d. That the genus *Ettingshausenia* is badly founded and has no value.

4th. That all the other plants enumerated by me are represented in the Tertiary and not in the Cretaceous.

5th. That it is improbable that in America the Cretaceous flora had the characteristic plants of the Tertiary, as would be

the case if the plants of which outline sketches were sent to Prof. Heer by Mr. Meek, were Cretaceous.

To which I reply,

1st. The plant I considered a *Credneria* is not *Populus lucæ* Unger, which, according to his descriptions in the *Foss. Flor. v. Sotzka* and *Genera et Species Plant. Foss.* has a toothed margin, while the leaf in question is entire.

I have recently obtained more and better specimens of this fossil, of which I have apparently three species, but as yet have not had opportunity to study them carefully.

They strongly resemble some of the species of that portion of the old genus *Credneria* to which Stiehler left the name (*C. integerrima*, &c.) when he established his genus *Ettingshausenia*. It may prove a new genus. Further study will alone determine this.

2d. That I was wrong in considering some of Dr. Hayden's fossils generically identical with those Stiehler designated by the name *Ettingshausenia*, I am by no means prepared to admit.

Prof. Heer has had but a single outline sketch of the plant, and can hardly speak decisively on the subject. When at Washington I had before me all the figures and descriptions of Stiehler, Zenker, Dunker, Bronn, and Unger, of the genus *Credneria*, and a large number of specimens in good preservation, for comparison. To me, and to Mr. Meek, who examined the subject with me, there seemed to be a marked correspondence in general form, texture and nervation, between our specimens and some lobate *Crednerias* (*Ettingshausenias* Stieh.). With these I regarded our fossils as generically identical, and shall continue so to regard them until the question—if question there be—can be definitely settled by a comparison of specimen with specimen—old world and new.

3d. Whether Stiehler was in error in establishing the genus *Ettingshausenia* upon a group of species of *Credneria*, I will not pretend to say, for I have nothing like the ample material possessed by him when he made the division; indeed this question has nothing to do with that now before us.

It is true that at the Smithsonian Institution I had access to nearly everything that has been published upon the genus *Credneria*, and it seemed to me the most natural thing in the world that Stiehler should give generic value to the cuneate or lobate form, and strongly marked yet finely reticulated nervation, which characterize the group of species of *Credneria* of which *C. cuneifolia* may be taken as a type, while he left the broadly rounded, entire, or merely toothed leaves, with a sparse and rectangular nervation, such as *C. integerrima*—leaves not very unlike those of *Coccoloba*—to which they have been compared—to retain the name of *Credneria*.

The vindication of his accuracy may, doubtless, be safely left to Stiehler. At least it would be nothing short of arrogance for any one who had not before him a suite of the specimens compared by Stiehler, to review his work and pronounce it either erroneous or correct.

4th. The statement that aside from the so-called *Credneria* and *Ettingshausenia*, *all* the genera enumerated in my letter to Messrs. Meek and Hayden, are represented in the Tertiary and not in the Cretaceous, is at least surprising. I am almost inclined to infer from it that Prof. Heer, though confessedly the highest authority in reference to the Tertiary flora of Europe, has neglected to acquaint himself fully with that of the Cretaceous formation. He makes the statement doubtless in good faith, but he can hardly have seen Stiehler's paper on the Cretaceous plants of Blankenburg, and if he has not seen that he is certainly not yet prepared to discuss intelligently the claims of *Ettingshausenia* to be recognized as a good genus; nor indeed the Cretaceous flora in any of its aspects.

Whoever will take the trouble to examine Stiehler's paper (*Palæontographica*, 1857) will see in the enumeration of plants found in the Lower Cretaceous strata (Quader sandstein) *Populus*, *Salix*, *Acer*, and several other genera which Prof. Heer says are represented in the Tertiary but not in the Cretaceous.

The fossil flora of Blankenburg is indeed strikingly like that of our Lower Cretaceous formation, from which the plants that have given rise to this discussion have been derived, except that ours is more varied, and we have as yet found no palms or *Cycadaceæ*.

5th. In regard to the probability or otherwise that the Cretaceous rocks of America should contain a flora similar to that of the Tertiary, it may be said, that it is not now a question of probabilities but of fact, the evidence of the case being now before us, and in abundance.

In what has heretofore been written in reference to these fossil plants two great questions have been raised, 1st, as to their botanical affinities, 2d, as to their geological position.

As to their botanical relations—outline sketches of a few of the plants have been examined by Prof. Heer. By him they were decided to contain representatives of the genera *Liriodendron*, *Populus*, *Laurus*, *Sapotacites*, *Phyllites*, *Leguminosites*, &c., and were pronounced Lower Miocene.

The entire collection was placed in my hands for examination and description before I knew that Prof. Heer had been written to on the subject. I supposed I found among them *Liriodendron*, *Salix*, *Alnus*, *Populus*, *Platanus*, *Pyrus*, &c., with the Cretaceous genera *Credneria* and *Ettingshausenia* and considered them Cretaceous. That you may see on what evidence that opinion was

based, I enclose a copy of my letter to Messrs. Meek and Hayden, which I chance to have with me.

Washington, D. C., Nov, 12th, 1858.

Messrs. MEEK and HAYDEN,

Gents: The fossil plants which you requested me to examine, I have looked over with great pleasure, and, in answer to your question as to the age of the strata from which they were derived, concur with you in the opinion that they belong to the Cretaceous epoch. They include, however, so many highly organized plants, that were there not among them genera exclusively Cretaceous, I should be disposed to refer them to a more recent era.

A single glance is sufficient to satisfy any one that they are not Triassic. Up to the present time no angiosperm dicotyledonous plants have been found in rocks older than the chalk, while of the eighteen species which compose your collection sixteen are of this character.

What was the general aspect of the flora of our Cretaceous continent we can only conjecture, as the specimens of it which we have, represent only its ruder and coarser elements,—the leaves of some of its deciduous trees, which, perhaps by an annual frost, were, as now in autumn, scattered on the surface of stream, lake, or sea, and, sinking, mingled with the sediment accumulating at the bottom.

In such an herbarium we could expect to find little else than the relics of some of the ligneous plants, and a very imperfect picture of the flora of the period.

The evidence furnished by your specimens is, however, good as far as it goes, and we are warranted in inferring from them the existence of a more highly organized flora during the Cretaceous period than has usually been attributed to it.

A flora so highly organized, embracing so many angiosperm dicotyledonous plants, should lead us to expect the discovery of what have not yet been found, plants of this rank in the Jurassic and Triassic rocks. Such a flora as is indicated by your specimens, could hardly have at once burst into being, but was doubtless preceded in the older formations by more or less highly organized plants, the prophetic types of those which followed them.

From the enumeration of the genera represented in your collections it will be seen that the flora of the Cretaceous epoch was not very unlike that of the temperate portions of our continent at the present time. The same thing may be said of the Miocene Tertiary flora of the Upper Missouri so fully illustrated in the collections of Dr. Hayden. In both the tropical and sub-tropical forms so common in the floras of the same period in Europe, are apparently wanting; indicating a greater relative uniformity of climate during the later geological epochs, and carrying the aspects of nature of the present, far back into the past. Thus it may be said of our plants as of our fishes, that many of them are "old-fashioned" types.

An interesting fact in this connection, to which I can only allude, is that the later extinct floras of Europe are more like the existing flora of North America, than is that now growing over the rocks which contain them.*

* Including as they do *Liquidambar*, *Liriodendron*, &c., now exclusively American

The species of your fossil plants are probably all new, though generally closely allied to the Cretaceous species of the Old World. From the limited study I have given them, I have referred them to the following genera:

Sphenopteris,	Cornus,	Salix,
Abietites,	Liriodendron,	Magnolia ?
Acer,	Pyrus ?	Credneria,
Fagus,	Alnus,	Ettingshausenia.
Populus,		

Of these the last two are exclusively Cretaceous and highly characteristic of that formation in Europe.

For comparison with the preceding list of genera, I subjoin a catalogue of the Cretaceous genera found at Blankenburg in the duchy of Brunswick, given by Stiehler in the *Palæontographica*, Sept. 1857.

	Credneria,	Pterophyllum,	Comptonites,
Algæ	Chondrites,	Flabellaria,	Populus,
	Halymenites,	Pinites,	Alnites,
	Delessertites,	Geinitzia,	Acer,
	Equisetum,	Araucarites,	Quercites,
	Pecopteris,	Salicites,	Juglandites.

I may say, in confirmation of the assertion that your fossil plants are Cretaceous, that I found near the base of the Yellow Sandstone series in New Mexico—called Jurassic by Marcou,—a very similar flora to that represented by your specimens, one species at least being identical with yours—associated with *Inoceramus*, *Gryphæa*, and *Ammonites*, of Lower Cretaceous species.

Yours, &c.,

J. S. Newberry.

Since that letter was written, I have added largely to my material illustrative of the American Cretaceous fauna and flora, having been for some months engaged in studying that formation over a large area, and where it exhibits an unequalled development.

Of the geological age of the deposits which contain the fossil leaves of which sketches were sent Prof. Heer, there cannot now be the slightest doubt. I have in my hands over sixty species of dicotyledonous plants obtained from the Cretaceous formation. At least half of these are derived from near the base of that system in New Jersey, Nebraska, Eastern, Middle and Western Kansas, New Mexico and Utah, collected by Prof. Cook, Mr. Meek, Dr. Hayden and myself. Some of the species are common to nearly all the exposures of the Lower Cretaceous sandstones, which I have examined, and everywhere serve for the accurate identification of these strata. Overlying the rocks containing all this flora, in the same continuous section, where the strata are conformable and undisturbed, both Dr. Hayden and myself have, in repeated instances, found many of the most characteristic fossils of the chalk, such as *Gryphæa Pitcheri*, *Inoceramus problem-*

aticus, *Ostrea congesta*, *Baculites ovatus*, *Ammonites placenta*, *Scaphites Conradi*, *Ptychodus Whipplei*, &c.

The botanical character of this group of plants is, in all essential respects, just what I represented it to be in my letter to Meek and Hayden. Among them are certainly *Populus*, *Salix*, *Alnus*, *Platanus*, *Liriodendron*, *Fagus*, *Quercus*, &c., the most common genera in our present forests.

The plant regarded by Prof. Heer as identical with Unger's *Laurus primigenia* is not a *Laurus*, but a *Salix*, as Prof. Heer would have seen if the specimen had been sent him, instead of an outline sketch. As I have before said, his *Populus leuce?* is not that species. The plants which he calls *Sapotacites* and *Leguminosites* are of doubtful affinity, but certainly not referable to these genera. The latter has a nervation closely allied to that of some of the *Rhamnaceæ*. *Phyllites* is not, as Prof. Herr is made to say in Marcou's pamphlet on "American Geology," "peculiar to the Lower Miocene," but is a general receptacle for fossil leaves of all ages of which the botanical affinities are doubtful, just as *Carpolithes* is a general name for fossil fruits.

It is greatly to be regretted that Prof. Heer could not have applied his great knowledge to the specimens themselves rather than to outline sketches; or, at least, that he should not have been permitted to exercise his excellent judgment unbiased by erroneous oral testimony.

The remarks of Prof. Heer on the fossil plants from the Pacific coast described by Mr. Lesquereux, are exceedingly interesting as forming a new page in the botanical history of American geology, and yet the quite different flora which has come under my observation from the Miocene strata of another part of the continent proves that what he has predicated of the flora, and hence the climate of the continent, though doubtless true of the region where Dr. Evans' fossils were found, is not of universal application.

The study of the floras of the different geological formations has always seemed to me to promise much toward giving us a just idea of the physical geography of our continent, during the different geological epochs. Acting on this conviction in such parts of the continent as I have visited, the fossil plants found, and the nature of the sediments containing them—generally the direct debris of the ancient land—have been to me objects of special interest and attention.

The general results of these observations on the extinct floras of North America may be very briefly stated as follows:

1st. The flora of the Devonian and Carboniferous epochs in America was, in all its general aspects, similar to that of the Old World, which has been so fully described; most of the genera, and a larger number of species than at any subsequent period

having been common to the two sides of the Atlantic. The relative number of identical species has, however, it seems to me, been somewhat overrated. In many of the species regarded as the same in Europe and America, the American plants present prevalent or constant characters which may serve to distinguish them. These differences, though frequently remarked by writers, have not been thought to have a specific value; yet it is quite certain that they are as tangible and important as those which now separate many American and European species of recent plants and recent or fossil animals. I have a conviction that the progress of science will considerably diminish the proportion of identical species; a closer scrutiny and more extensive comparison of specimens resulting in the discovery of constant, though inconspicuous characters which shall be ultimately conceded to be specific.

It is true also that in molluscous palæontology, recent geology and botany, the number of species common to the two continents has been considerably reduced of late years; a large number of American representatives of European species at first considered identical from their striking and obvious coincidences, having, on closer study, afforded constant, though less conspicuous differences.

2d. The Permian, Triassic and Jurassic rocks have hitherto furnished us but few species for comparison, but the material is increasing, and I have now on hand quite a collection which has not yet been studied. Enough is already known to show that the great revolution which took place in Europe at the close of the Permian epoch was matched by a parallel though less sudden change in the flora of America.

Here as there the Lepidodendroid trees, the *Sigillariæ*, the *Nœggerathiæ*, the *Asterophyllitæ*, and the great variety of ferns that gave character to the Carboniferous vegetation, were superseded by *Voltzia*, *Tæniopteris*, *Camptopteris* and a varied and beautiful Cycadaceous flora, in which were many species of *Zamites*, *Pterophyllum*, *Nilssonia*, etc., the representatives of those of the "Age of Gymnosperms," which culminated in the Jurassic epoch of Europe.

During this great interval the generic correspondence between the floras of Europe and America was perhaps as plainly marked as during the Carboniferous age, but the relative number of identical species was apparently smaller.

3d. At the commencement of the Cretaceous epoch the flora of the continent was again revolutionized and the vegetation of its temperate portions given the general aspect that it now presents.

This statement will surprise many, for the flora generally ascribed to the Chalk period is greatly different from that of the

present. Unger has thus represented it, and Brongniart calls it a transition from the great Cycadaceous flora, of the Jurassic period, to the Angiospermous flora of the Tertiary. In Europe the Cretaceous flora was, apparently, more like that of the Lias and Oolite than in this country, for while the genera *Salix*, *Acer*, *Populus*, *Alnus*, *Quercus*, &c., were then introduced there as here, its general aspect was modified by the presence of numbers of *Cycadaceæ*, and its sub-tropical character attested by fan-palms.

We may find hereafter, in other parts of the continent than those in which I have examined the Cretaceous strata, fossils which shall assimilate our flora of that period more closely to that of Europe, but as far as at present, known, our plants of this age present an *ensemble* quite different. I have now some sixty to seventy species of Cretaceous plants collected in New Jersey, and in various parts of the great Cretaceous area of the interior of the continent, all of which indicate a flora very similar to that now occupying the same region; many, perhaps most, of the genera being now represented in our forests—such as *Liriodendron*, *Platanus*, *Acer*, *Populus*, *Salix*, *Alnus*, *Fagus*, &c. These specimens have been collected in localities included between the 36th and 41st parallels of latitude, but range from the 74th to the 110th of longitude. Nowhere within this area have I yet detected any traces of palms or any indications of a tropical climate. At the base of the Yellow sandstone series of New Mexico, (Lower Cretaceous,) I have found a varied and interesting flora, containing *Pterophyllum*, *Nilssonia*, *Camptopteris*, &c., with a few Angiosperm dicotyledonous leaves. This is evidently the point of junction between the Cycadaceous flora of the Jurassic age and that of the Chalk; for in the entire overlying Cretaceous strata, 4000 ft. in thickness, though Angiospermous leaves are abundant, those of Gymnospermous plants were nowhere discovered, nor any traces of palms, either leaves or stems. The sandstones of the Cretaceous series contain immense numbers of silicified trunks but they are for the most part coniferous.

4th. For the glimpses I have obtained of the Tertiary flora of North America I am mainly indebted to the kindness of Dr. Hayden, who has spent several years in most successfully exploring the geology, botany and zoology of the country bordering the Upper Missouri. Among his rich collections are fifty or more species of beautifully preserved fossil plants from the Miocene, which have been put in my hands for examination, and of which descriptions will be published immediately after my return to Washington.

Not having the specimens, or my notes on them, with me, I can speak only generally of the flora they represent. I remember, however, that they include species of *Platanus*,—one of which closely resembles Unger's great *P. Hercules* and is perhaps

as large; *Populus*, *Acer*, *Castanea*, *Sapindus*, *Carpinus*, *Ulmus*, *Diospyros*, *Quercus*, *Salix*, *Taxodium*, and others which indicate a flora in all its general aspects similar to that now occupying the Valley of the Mississippi. A few plants in the collection would seem to have required a somewhat warmer climate than that which the localities where they are found enjoy at present; but there are no palms among them, nor any of the tropical genera *Cinamomum*, *Sterculia*, *Dombeyopsis*, &c., so common in the Tertiary strata of Europe.

In the enumeration of the Miocene plants of the Pacific coast, given by Mr. Lesquereux in the May number of this Journal,* I find also evidence of a marked and interesting difference of temperature during the Tertiary epoch, in different parts of the North American continent, under the same parallels of latitude. Mr. Lesquereux finds in Dr. Evans's collection Palms *Salisburia*, *Cinamomum*, &c., which indicate, at least a sub-tropical climate; a flora quite unlike that from the Miocene of the Upper Missouri, although, as he remarks, similar to that of the Miocene of Europe.

I am tempted to dwell for a moment on the interesting glimpses of the physical geography of our continent in geological times, which these facts and others that have come under my observation afford; for, to you, who have done so much toward the elucidation of its geological history, this cannot, I am sure, be a matter of indifference, but my letter has already grown to an unreasonable length. Let me then close with a few generalizations, referring you to my reports for all details of fact sustaining them.

1st. A large continental area occupied the place of the interior of North America from the earliest Palæozoic ages.

2d. During the Carboniferous epoch this land sustained a vegetation similar to that of the Coal period of Europe and Eastern America, though far less varied.

3. Through the Triassic and Jurassic ages the sediments from the land were strikingly like in mineral character to those of the same age in the Old World: and the flora was characterized by a preponderance of Cycadaceous plants, analogous to those of the Jurassic of Europe.

4th. In the Cretaceous age, the central nucleus of the continent was sufficiently extensive to furnish from its ruins arenaceous sediments that now cover more than half a million square miles. These sediments contain vast deposits of carbonaceous matter, mainly derived from the land plants which covered the continent. As far south as lat. 35° these plants were for the most part Coniferous or Angiospermous, and included many genera now characteristic of temperate climates.

Through the Tertiary epoch our continent had nearly the form and area it now has, the Tertiary deposits merely skirting its

* xvvii, [2], 361.

borders. The Marine Tertiaries are nearly limited to the shores of the present oceans, while the patches of strata of that age found nearer the centre of the continent are all, so far as I have observed or heard, of fresh water or estuary origin. Between the western base of the Sierra Nevada and the Mississippi there are, I believe no Tertiary beds not of this character, and the larger part of the great central plateau has never been covered with Tertiary or Drift sediments, but has, since the close of the Cretaceous epoch, been as now, dry land.

The facts which I have enumerated seem to indicate that over this ancient land the isothermal lines were curved much as now, and that during the Tertiary ages there was, perhaps, as great a difference between the climate of the Pacific and Atlantic water sheds as exists at present.

ART. XXI.—*Abstract of a Meteorological Journal, kept at Marietta, Ohio:* lat. 39°·25 N. and lon. 4°·28 W. of Washington City; by S. P. HILDRETH, M.D.—For 1859.—[Thirty-third annual report.]

1859. MONTHS.	THERMOMETER. Mean temperature.	Maximum.	Minimum.	Fair days.	Cloudy days.	Inches of rain and melted snow.	Prevailing Winds.	BAROMETER. Maximum.	Minimum.	Range.
January,	33°·00	63	4	17	14	3·10	W., S.W.	29·85	28·95	0·90
February,	37·77	62	10	10	18	7·20	S.W., & E.	29·60	28·85	0·75
March,	48·48	77	25	12	19	5·08	S.E., & S.W.	29·70	28·80	0·90
April,	52·03	83	28	14	16	6·46	N., & N.W.	29·60	28·85	0·75
May,	67·20	90	46	21	10	1·56	S.W., & N.	29·80	29·10	0·50
June,	67·23	93	33	17	13	4·62	S., W., & E.	29·70	29·20	0·50
July,	74·23	102	49	23	8	1·08	E., S.E., & N.	29·73	29·20	0·53
August,	72·10	95	46	15	16	4·46	S., & N.	29·53	29·30	0·23
September,	63·51	86	46	12	18	4·95	S., & W.	29·70	29·10	0·60
October,	49·12	79	26	17	14	2·79	S.W., & N.W.	29·65	28·85	0·80
November,	45·50	72	20	20	10	2·08	S.S.W., & E.	29·85	29·00	0·85
December,	30·48	71	5	12	19	5·17	N. & W.,	29·75	28·80	0·95
Mean for year,	53·38					Rain 48·55 inches.				

Remarks on the seasons.—The mean temperature for the year 1859 is 53·38, which is somewhat above the average for this locality.

The amount of rain and melted snow is 48·55 inches. The average in a series of years, being forty-two inches, falling occasionally to thirty-two inches, and again rising, as in 1858, to near sixty-two inches, so that our climate is quite variable in this respect. The number of cloudy days bear testimony to the humidity of the year.