the western border of the American continent with that which traverses the Atlantic and properly pertaining to the latter band (pp. 228-235). A better acquaintance with the volcanic vents, active and extinct, both of the West Indies and of the eastern border of the American continents will find in these a fifth band, additional to the four enumerated (pp. 228-235), marked by the Alleghany axis along the eastern border of North America and that of the Highlands of Guiana and Brazil, in South America; while the sharply defined intermediate chain, traversing the great subsided continent which lies beneath the Caribbean sea, still retains a few active vents. May their present partial activity be an indication of the commencement of an era of renewed elevation over that now deeply sunken area?

The work presents also a few minor blemishes which might be easily corrected in another edition. Only in the vague phrase—"a high power of the microscope," (p. 53)—can the reader, unfamiliar with the subject, find a clue to the magnification employed in those figures of the frontispiece representing the excessively minute structures found in the vitreous and crypto-crystalline rocks. The same objection applies to the figures and descriptions of the minute liquid cavities detected in the crystals of rocks (fig. 7, p. 61). In one figure, part of the reference letters have been obliterated (fig. 36, p. 118). The desire to avoid the appearance of a text-book has led to the omission of all sub-divisions of the text, such as headings or marginal references, within the twelve chapters: the consequence has been a series of apparently abrupt and even violent changes of the subject without assistance to the eye, which at first produces a rather puzzling impression on one's succession of thought, and, without resort to the index—which is excellent—renders difficult a later reference or return to any desired paragraph. The wood cuts are abundant, well chosen, and in general so well executed as to render the coarseness of one of the full page illustrations (fig. 41) somewhat unpleasant to the eye. May not even the scientist, the vulcanologist, be an æsthete? May not even his hard trappean intellect crave, beyond the dry facts shown in this rough sketch the finer lines which may suggest the balmy atmosphere which rests over this isle in the Mediterranean, the tender green upon its hillsides, the delicious blue of the heavens above and of the waters beneath?

But perhaps the most serious defect of the book, at least for American readers, for whose benefit this volume of "The International Scientific Series" has been largely prepared, lies in the almost entire absence of illustrations, either in the text or figures, taken from the volcanic localities on this continent, whose descriptions now abound in all the current literature, ready to Prof. Judd's hands. Derision is well expressed in Chapter I, at the absurd views prevalent not only among the ancients but in modern school manuals, concerning the nature of volcanoes. But here is a new book, just issued by an American publishing house, to teach the American public "what a volcano is," with an almost complete disregard of the volcanic materials, upon and into and among which American feet and hands are walking and digging and climbing every day! It was well to give prominence to the work of Scrope, Hamilton, Möhl, and, above all, Palmieri, and the excellent Italian school of vulcanologists, but the value of such a book, for popular and "International" purposes, would have been largely augmented by less meagre references to the grand instances of volcanic outbursts in this hemisphere, whose descriptions we owe to the laborious study of Dana, Newberry, Hayden, Gilbert, Endlich, Dutton, and many others. The little hills of England, Wales and Scotland afford excellent illustrations of extinct volcanic vents for the British public; but why, O why, should not discreet reference be vouchsafed to transatlantic localities for the benefit of Prof. Judd's thirty odd millions of cousins? For example, for volcanic activity in Cambro-Silurian times (p. 274), to the vast outflows on the present borders of Lake Superior: for its cessation in this hemisphere during a vast subsequent period, to the scarcity or entire absence of such outflows in all our Devonian and Carboniferous basins: and for its resumption here, during the repose of the European vents, to the enormous eruptions of trap through the Triassic beds along the whole Atlantic seaboard, and, still later, throughout the Western Cretaceous plateaus.

It is shown (p. 227), and will doubtless prove a surprise to many an American reader, that "the American Continent contains a greater number of volcances than the divisions of the Old World. There are twenty in North America, twenty-five in Central America, and thirty-seven in South America," *i. e.*, eighty-two great volcanic vents in action on our continents, to only thirty-five in Europe, Asia and Africa. But, more than this, the same great band "contains, with its branches, nearly a hundred active volcanoes," and this fact, taken in connection with the vast volcanic outflows from ancient vents which overspread the Western plateaus, indicates that America is the grandest field in the world for the study of volcanic phenomena; and this little book, excellent as it is, with the limited field of observation from which it has been mainly written, gives a suggestion of the magnificent monograph on this subject which is yet to come from some American hand.

ALEXIS A. JULIEN.

THE GREAT PRIMORDIAL FORCE.

By Dr. H. Raymond Rogers.

Continued.

The existence of other affections of the primordial force, in addition to those already recognized as the "Great Physical Forces," has been more than suspected by distinguished scientists. HUMBOLDT pertinently asks: "who will venture to affirm that we have discovered the whole number of forces which pervade the universe?"

Among the non-recognized affections which are legitimately entitled to a position in that category, we now take the liberty of including

WIND.

According to present conceptions and teachings concerning the *modus-operandi* of wind-production, wind is due to the creation by the sun's heat of a warm, light atmosphere, or rarified atmosphere which rises, the colder surrounding air rushing in from all sides to restore the equilibrium. The equatorial regions, being most highly heated, are the grand theatre of this complex movement. The equatorial air rising, the air both north and south moves forward to make good the deficiency. This new air, in its turn is heated and rises, and thus a constant upward current is established, and at the same time two opposite lateral surface currents. Add now to this movement the motion of the earth on its axis to modify these lateral currents and we have the great ærial currents as now existing, as for example, the trade-winds. Periodical and occasional storms originate in differences of temperature produced likewise by the sun's heat, which causes a movement for the restoration of a disturbed equilibrium. The regular or prevailingwinds of our temperate zone are produced by the meeting of equatorial and polar currents.

Such is the main theory. But yet in explaining the details of the theory there is such a lack of unanimity as to render the whole theory doubtful. The rotary theory of DOVE, the centripetal, or in-blowing theory of ESPY, and the theory of BLASIUS which antagonizes both, evince the existing uncertainty and dissatisfaction. If we allow BLASIUS to begin a storm, REDFIELD to manage the middle of it, and ESPY to finish it up, we may get a plausible theory.

However, upon thoughtful consideration, there are

found to be too much variety, too much system and regularity, also too much *irregularity*, in these mysterious aerial phenomena, to be lightly explained by causes which are *only sufficient to account for a confused commotion of the atmosphere.* The orderly system of winds, the variety of their movements,—such as the shaking of a solitary leaf here and there; the liliputian dust whirlwind seen upon our streets; fitful gusts and squalls; intermittent pauses and blasts in storms of all kinds; the pillar of fire that sometimes constitutes the whirlwind; and the terrific outbursts and violence of the tornado;—these point to some productive agent, or agents, other than such as are only competent to create a mere stir and confusion of the aerial elements.

Now, supposing the winds to be due to the operation of the presumed calorific and axial agencies aforesaid,—is it not a difficult thing to explain why there should not be precisely the same and equivalent aerial effects day after day, in a never ceasing repetition? Causes remaining the same, effects could not be so very different. One day is calm and quiet, while the next is exceedingly windy. Yet meanwhile, sun and earth are in unaltered relations to one another, the sun's rays rarifying the atmosphere and the earth steadily revolving on both days alike. Endless phenomenal movements are left unaccounted for. We understand of course that commendable attempts have been made to explain such changes and yet ample room is left for a more self-demonstrating hypothesis.

Even granting that the sun's heat is the *primum mobile* of winds and storms, it is reasonable to suppose that their movements would be exceedingly slow and destitute of regular and well defined boundaries. Method in their action would be wanting, or else it would be a different method from that which is observed. Thus, whirlwinds and devastating tornadoes, often, and indeed generally, arise out of perfect calmness, and leap forth into hurricane velocity. In order to explain them it is affirmed that contrary winds of different temperatures, meeting, "*bank up* against each other," and push like two great wrestlers, and there, piling up more and more, they stand with ominous quiet until, by reason of hill or depression in the configuration of the given region one gains the ascendency and then they enter into a whirling conflict with devastating fury. It reminds us of Virgil's representation of old Æolus letting out the winds from his cave, and the difficulty with which they were brought into confinement again. The objection to such explanation is that they are not only purely hypothetical, but also lack support of analogy to anything else. The explanation itself even more loudly calls for explanation than the original phenomenon explained.

We therefore hold that wind phenomena are yet inadequately interpreted. Calorific force is owing to the immediate action of the sun; yet in the polar regions, from which the sun is for half the year absent, and where, during that period, the temperature is far below zero, wind prevails in its fiercest forms. We must here exclude calorific influences from our reckoning. During this self-same period, in the equatorial region, the sun is at its greatest altitude, and transmits its beams almost vertically through the deepest, densest atmospheric mass, whereby its calorific effect reaches its maximum; yet, notwithstanding these most favorable conditions for the development of wind in the tropical belt, wind prevails in the *sunless* polar regions with a greater *constancy* and *force* even, than in the equatorial.

The theory that the earth in its axial motions is capable of developing wind is destitute of rational support. There is but slight evidence of such result in the region where such motion, if it existed, would find its greatest velocity, viz: at the equator. Between the two trade-winds are the zones, significantly termed the *Zones* of *Calms*. In these zones the waters appear like a vast sheet of ice, and a ship therein appears as if nailed to the limpid crystals, while the solar rays fall vertically upon the deck. Within these zones no atmospheric currents have ever been discovered which could be rationally attributed to such axial motion of the earth. In fact the equatorial belt is confessedly most exempt from *steady, forceful* winds; and there is no record of a hurricane having been encountered on the equator. Calorific influence and axial motion therefore most signally fail to account for the production of wind.

In studying the inherent character and mode of action of this formidable force it becomes indispensable to seek out a philosophy which shall not only demonstrate a cause commensurate with the vastness of its field and its power, but also one which shall be consistent with its varied phenomena. Such a philosophy must conform to the requirements of the law of conservation of force. We must possess a correct knowledge of the ingredients of which the atmosphere—the field of its operations—is composed, and also of the relations between it, and the earth upon which it is superimposed. One ingredient has heretofore been wholly ignored as a real entity. All theories afore-mentioned disregard this ingredient, through which alone may be explained the wind's vast and varied phenomena. This ingredient is magnetic.

That the atmosphere is a vast magnetic reservoir, that it is one of the most magnetic of earthly bodies is well understood. That the earth is also such a reservoir of magnetic force, and that reciprocal and instantaneous action takes place between the atmosphere and the earth through the medium of the magnetic constituent, is also well understood, yet no effort has been made to utilize the knowledge of such intimate relationship and sympathy in the construction of the theories of the wind.

The great earth-core with its 250,000,000,000 of cubic miles of matter to a quarter or less extent and degree incandescent, may be presumed to exercise functions of which little account has heretofore been made. These functions must necessarily be commensurate with its stupendous mass. In the retro-acting phenomena which are manifested between the sun and earth we may justly attribute to this mass a co-operation in the production of the grandest of terrestrial effects, viz: the greater physical forces; among these effects we may class wind.

Sudden sun-bursts produce instantaneous magnetic effects throughout the earth. Magnetic storms simultaneously disturb the needles over an area nearly or quite equal to the terrestrial surface, and lesser areas are being incessantly disturbed. Thus terrestrial magnetic action is constantly taking place. The atmospheric magnetism being in closest sympathy and in fixed and exact relations with the terrestrial, must be influenced by it.

The *a priori* conclusions of the old theories are strangely negatived by constantly observed facts. Thus, strong gales are seen to leap out of perfect calmness into hurricane velocity, and afterwards to cease as suddenly as though stopped by the interposition of some mighty invisible wall. Tornadoes mow their swaths through forests and villages scarcely rippling the neighboring air or disturbing the adjacent territory or its belongings. There are observed to be, transverse and opposite currents moving simultaneously, at varying rates of speed, some slow, some exceedingly swift. Indeed the entire atmosphere, to the altitude of many thousand feet, is constantly traversed by horizontal currents of air, flowing in different directions, and at different elevations. An aeronaut at the elevation of 14000 feet encountered a current that carried him at the rate of five miles per hour, but upon descending only 2000 feet he met a contrary wind blowing with a velocity of eighty miles per hour. The common old theory certainly leaves all these phenomena unexplained. Calorific influences may have granted to them a generous allowance of efficiency, but no man can see *how* they are able to explain such results as we have recounted. It is a purely mechanical theory. It presupposes the atmosphere to be only a loose mixture of gaseous materials, and the winds to be owing only to mechanical disturbances

within it. It is not easy to see how a *law* of the winds can be educed from such a theory. Such a theory of the winds misses its real intimate nature, and is insufficient. But once conceive the atmosphere as arranged like a perfectly adjusted instrument for the meeting-place and co-operation of sun-force, and earth-force, where are elaborated all the benefits designed for our mundane creation, and we begin to look for better explanations.

From necessity, our philosophers have been compelled to acknowledge that *certain* of these phenomena exhibit signs of an electric origin. Certainly they were accompanied by electrical effects. It is granted that there are established electric currents in the atmosphere and within the earth itself. The magnetic poles are facts that no one thinks of gainsaying. The reservoirs of electricity are at hand to be made use of; and it is known that to them belongs a range of activities within the great economy of the earth. Have we not reason to believe that the winds are intimately associated with this electric force? Why should the two be divorced in our philosophy and in our science? Why should it be thought incredible that we are on the eve of better explanations of the wind?

The wind is moving air—this will answer for a rough definition, where only effects and not causes are considered. *The wind is the electric force operating on, and within the air, variously in different parts and portions of the air*—this may be called a definition which considers causes as well as effects. FARADAY says that "the earth is itself a magnet, pervaded in every part by this mighty power" [magnetism]; and he supposes that it has a purpose. The earth has its magnetic polarity. To its magnetism certain electrical currents are related. Between the magnetic earth and the enveloping magnetic atmosphere and its magnetic clouds there is an electrical commerce and interplay. The law of a necessary equilibrium is proclaimed by every thunder-storm, by every shaft of lightning that visits the earth. Does not the same force find in the air one of its chief agents? Who can doubt it? We cannot then be far out of the way when we say that *in the interplay of that subtle, all-pervasive principle is found the key to the theory of the winds.*

Thus in viewing the earth and atmosphere as vast reservoirs of that subtle principle, shifting back and forth to maintain an equilibrium, we believe that we are enabled to see the workings of the very force which moves and sways the atmosphere; which causes its currents both general and special, and which gives rise to its more extraordinary and yet unexplained phenomena. It is not excessive boldness on our part to affirm that never as yet has due attention been paid to the electrical changes in the conditions of the earth, and of the atmosphere—and, as scientists are beginning to suspect—of the sun also.

It is known that electricity moves with difficulty through air. It may far more easily be the cause of movement of the body of the air, of which it is itself a vital constituent. By virtue of the associated electricity in each—one body of air, or one stratum of air is attracted towards another, or repelled from another, or otherwise influenced, according to the law that likes repel and unlikes attract. But, besides the mutual influence of electrified bodies and strata of air upon one another, there is the controlling influence of the established electric or magnetic currents upon these electrified bodies and strata; and the controlling influence of the magnetic earth itself, and her hidden currents. Such are certain necessary elements in the problem of the wind, that scientists may not leave out of their reckoning.

In support of the electrical hypothesis we have the influence of high authorities, and the demonstration of constantly observed facts. FLAMMARION, in speaking of the whirlwind, says: "we know that a whirlwind is a column of air which turns upon its own axis, and which advances comparatively slowly. This whirling column of air is both caused and set in motion by electricity." PELTIER has established both by numerous facts and by a series of experiments, that the waterspouts of the land and sea are electrical phenomena.

This had been suspected by BECCARIA a hundred years before.

If whirlwinds (and waterspouts) are caused by electricity, why may not all other forms of wind be products of the same force?

FLAMMARION also says: "generally speaking, the action of electricity is superadded to the violence of the air in motion, and helps to augment the ravages of the tempest: sometimes flashes of lightning are so rapid that they descend like a sheet of flames; the clouds, and even the drops of rain, emit light. A whole forest in the island of St. Vincent was killed without the trunk of a single tree being blown down. In Europe, too, upon the shores of Lake Constance, many trees were skinned of their bark, though they still remained upright in the ground."

HUMBOLDT thus aptly says: "the electricity of the atmosphere, whether considered in the lower or upper strata of clouds—in its silent, problematical, diurnal course, or in the explosion of the lightning and thunder of the tempest—appears to stand in a manifold relation to all phenomena of the distribution of heat, of the pressure of the atmosphere and its disturbances, of hydro-meteoric exhibitions, and probably also of the magnetism of the external crust of the earth."

From the great number of authentic facts which demonstrate the electrical character of the winds, we select the following:

The hurricane which occurred in the Barbadoes in 1831, was the most remarkable on record. The lightning for hours played in forked darts, and moved frightfully between the clouds and the earth. The moment this singular alternation of the lightning passing to and fro, ceased, the hurricane burst with a violence which exceeded all which had yet been experienced. The winds blew with appalling velocity, and changed their course *frequently* and *almost instantaneously*, occasionally abating but only to return in gusts from S. W.-W. and N. W. with accumulated fury. These *alternations* of wind and violent electrical demonstrations were something more than coincident, more than a casual connection; herein we observe a manifest inter-dependence.

A remarkable phenomenon was exhibited by a hurricane at sea in 1837, and described by CAPT. SEYMOUR, of Cork:" for an hour we could not see each other nor anything else but merely the light, and more astonishing, every one of our finger-nails turned quite black, and remained so for nearly five weeks afterwards. This fact," says CAPT. S., "may be classed among the proofs of the agency of electricity in the production of hurricanes."

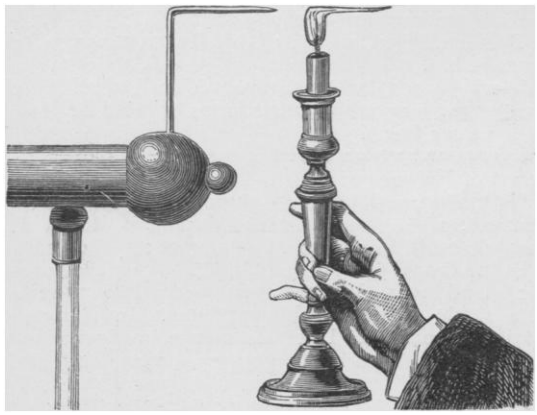
On the 26th of August, 1826, the neighborhood of Carcassonne was visited by an enormous *column of fire* which, sweeping along the surface of the soil, destroyed everything that lay in its passage.

In the whirlwind that devastated Chatenay in 1839 the trees that lay within its circumference were burned up. In fact, trees were found with the side which had been exposed to the storm completely scorched and burned, whereas the opposite side remained green and fresh.

During a whirlwind which occurred in the plain of Assonville, July, 1822, the rapidly revolving cone, as it rose, emitted a sound like that caused by the bursting of a large shell, leaving an indentation upon the ground twenty-five or thirty feet in circumference and to a depth of three or four feet in the middle. Globes of sulphurous vapor were from time to time emitted, and the noise which was made was like that of a heavy carriage driven rapidly over paving-stones. Each time that a *globe of fire* or vapor was emitted there was an explosion like that of a gun.

The foregoing phenomena of the wind could under

no circumstances or conditions be produced by calorific influence.



☞PLATE.

If a metallic rod terminating in a point be attached to the conductor of an electrical machine, electricity escapes in large quantities from the point. A continuous current is thus kept up and the flame of a taper, if placed in front of the current, is blown in a horizontal direction. If the point be removed from the conductor, a current of wind issuing from the conductor may be felt by the hand. Wind is thus *manufactured* on a small scale.

The ancient vague presentiment of electric and magnetic action is verified in our times. KUOPHO, a Chinese physicist of the third century, says: "the magnet attracts iron as amber does the smallest grain of mustard seed. It is like *a breath of wind* which mysteriously penetrates through both and communicates itself with the rapidity of an arrow."

We have seen the marks of electrical action in the cases cited, and since we know something of the subtlety of the agent—that it may be "amassed, condensed, and rarified," that it is not loose and wandering, and the mere plaything of fortuitous forces, as the atmosphere is supposed to be, but, on the contrary, has close and most sympathetic adjustment with the earth-force; and that *it* is the invisible hand that holds and manages the grosser atmospheric matters;—since we know this, we are now brought to the study of a great cosmical system.

NICKEL ELECTROTYPES.—Nothwithstanding the ease with which nickel is deposited now-a-days, it has required years of careful work to learn how to deposit a sufficiently thick and solid layer of nickel on wax or gutta-percha impressions. The *Revue Industrielle* says that the difficulties have now been successfully overcome, as the nickel electrotypes shown at the recent Paris Electrical Exhibition prove. Although costing double the price of copper electrotypes those made of nickel have the advantages of allowing a much greater number of impressions to be made, of not being so easily injured by oxidation, and of permitting colored inks which attack copper to be used.

METEOROLOGICAL REPORT FOR NEW YORK CITY FOR THE WEEK ENDING DEC. 10, 1881.

Latitude 40° 45′ 58″ N.; Longitude 73° 57′ 58″ W.; height of instruments above the ground, 53 feet; above the sea, 97 feet; by self-recording instruments.

DECEMBER.	BAROMETER. MEAN FOR THE DAY. Reduced to Freezing.	BAROMETER. MAXIMUM. Reduced to Freezing.	BAROMETER. MAXIMUM. Time.	BAROMETER. MINIMUM. Reduced to Freezing.	BAROMETER. MINIMUM. Time.	THERMOMETERS. MEAN. Dry Bulb.	THERMOMETERS. MEAN. Wet Bulb.	THERMOMETERS. MAXIMUM. Dry Bulb.	THERMOMETERS. MAXIMUM. Time.	THERMOMETERS. MAXIMUM. Wet Bulb.	THERMOMETERS. MAXIMUM. Time.	THERMOMETERS. MINIMUM. Dry Bulb.	THERMOMETERS. MINIMUM. Time.	THERMOMETERS. MINIMUM. Wet Bulb.	THERMOMETERS. MINIMUM. Time.	MAXI'M In Sun
Sunday, 4	30.109	30.148	12 p. m.	30.078	1 p. m.	37.6	37.0	39	1 p. m.	38	1 p. m.	35	3 p. m.	35	3 p. m.	47.
Monday, 5	30.200	30.208	9 p. m.	30.148	0 a. m.	39.0	36.6	43	2 p. m.	39	2 p. m.	35	11 p. m.	35	12 p. m.	100.
Tuesday, 6	29.986	30.172	0 a. m.	29.712	12 p. m.	39.3	37.0	44	3 p. m.	40	3 p. m.	32	7 a. m.	32	7 a. m.	74.
Wednesday, 7	29.485	29.712	0 a. m.	29.410	2 p. m.	41.0	38.3	44	3 a. m.	41	3 a. m.	35	12 p. m.	35	12 p. m.	52.
Thursday, 8	29.855	29.958	12 p. m.	29.578	0 a. m.	33.3	31.0	37	3 p. m.	33	0 a. m.	30	9 a. m.	28	9 a. m.	94.
Friday, 9	29.981	30.008	12 p. m.	29.950	5 a. m.	37.7	35.0	43	2 p. m.	38	2 p. m.	32	7 a. m.	31	7 a. m.	95.
Saturday, 10	30.193	30.362	12 p. m.	30.008	0 a. m.	28.6	27.7	38	0 a. m.	35	0 a. m.	22	12 p. m.	22	12 p. m.	96.

		Dry.	Wet.
Mean for the week	29.972 inches.	36.6 degrees	34.6 degrees.
Maximum for the week	at 12 p. m., Dec. 10th 30.362 "	at 3 pm., 6th 44. "	at 3 am 7th, 41. "
Minimum "	at 2 p. m., Dec. 7th 29.410 "	" 12 pm., 10th 22. "	at 12 pm 10th, 22. "
Range	.952 "	" 22. "	19. "

DECEMBER.	WIND. DIRECTION. 7 a. m.	2 p. m.	9 p. m.	VELOCITY IN MILES. Distance for the Day.	FORCE IN LBS. PER SQR. FEET. Max.	Time.	HYGROMETER. FORCE OF VAPOR. 7 a. m.	2 p. m.	9 p. m.	RELATIVE HUMIDITY. 7 a. m.	2 p. m.	9 p. m.	CLOUDS. CLEAR, 0 OVERCAST. 10 7 a. m	2 p. m.	9 p. m.	RAIN AND SNOW. DEPTH OF RAIN AND SNOW IN INCHES. Time of Beginning.	Time of Ending.	Duration. h. m.	Amount of water	OZONE.
Sunday, 4	n. n. e.	n. n. e.	n. e.	198	31	3.30 pm	.199	.229	.207	90	100	90	10	10	0	0 am	6 pm	18.00	.50	7
Monday, 5	n. e.	e.	n.	170	34	5.50 am	.191	.186	.186	90	67	81	4 cir. cu.	1 cu. s.	0	-----	-----	----	--	1
Tuesday, 6	n.	s. s. w.	s.	87	3	5.30 pm	.181	.186	.208	100	67	75	3 cir. s.	7 cir. cu.	8 cu.	-----	-----	-----	--	0
Wednesday, 7	s. w.	w. n.w.	w. n.w.	286	12	11.15 pm	.221	.231	.144	83	83	63	10	9 cu.	1 cir. s.	4 am / 1 pm	10 am / 1.30 pm	6.00 / 0.30	.19 / .01	9
Thursday, 8	n. w.	w. n.w.	w.	364	17	0.40 am	.149	.129	.155	89	61	79	0	1 s.	3 cir.	-----	-----	-----	--	0
Friday, 9	w. s. w.	w.	w. n.w.	182	3	7.00 am	.164	.186	.186	89	59	81	7 cir. cu.	9 cu. s.	4 cir. cu.	-----	-----	-----	--	8
Saturday, 10	n.	n. n. w.	n. n. w.	226	9	1.50 pm	.174	.119	.129	100	68	100	8 cu.	2 cir. s.	0	-----	-----	-----	--	8

Distance traveled during the week	1,513	miles.	Total amount of water for the week .70 inch.
Maximum force	17	lbs.	Duration of rain 1 day, 30 minutes.

DANIEL DRAPER, Ph. D.

Director Meteorological Observatory of the Department of Public Parks, New York.