But Linne did better than this toward the solution of our problem. In his 'Philosophia botanica' of 1751, he, among other things, makes the following propositions: —

"Principium florum et foliorum idem est,"
"Principium gemmarum et foliorum idem est,"

which, so far as it goes, would seem a clear statement of the truth; but it is doubtful whether the author, as he wrote, appreciated the full import of his words. Certainly his immediate followers and pupils did not. He stood face to face with the truth, but recognized it not, and turned away from it, and from the only line of thought which could possibly lead to light, only henceforth to wander in vain speculations and obscurities pertaining to his theory of prolepsis, — a theory understood neither by his contemporaries, his successors, nor possibly even by himself.

But while Linné was thus hopelessly lost in the mazes of his own imaginings, another mind, working in an entirely different field, took cognizance of the problem. A young student, afterwards known to fame as Caspar F. Wolff, away in central Germany in Frederick's university of Halle, had caught the spirit of genuine scientific research, and in his thesis for graduation in 1759 published an exact, succinct, and perfectly clear statement of the modern doctrine of vegetable morphology. Wolff had ideas of his own concerning generation in all the organic world, more particularly in the world of animal life. His taste lay in the line of anatomy in its ordinary scope; and the reference in his thesis to matters botanical was entirely apart from the chief purpose of his dissertation, simply incidental for the sake of completeness; and perhaps, with the propositions of Linné, above cited, before him, he had no thought of propounding any thing new to botanical science. In perfect harmony with his subject, Wolff undertook to elucidate the origin of the various organs of a plant, and in so doing was struck with the extraordinary similarity everywhere patent. Regarding the involucre of the 'compound' flower as calyx, he perceived easily the intergradation of foliage and sepals; the ripened capsule, with bursting sides, afforded evidence of the foliar nature of the carpels; that the seed is largely made up of leaves, appears when it germinates, and the cotyledons assume and perform, to some extent at least, the leaf's function; sepals and petals are often interconvertible, and stamens not infrequently show transition to petals: consequently in the entire plant, so far as immediate analysis goes, we find nothing but root, stem, and leaves.

As Wolff's thesis had to do with generation, and not at all with botany, it is a matter of no surprise that he regarded all this simply as introduction, and went on with his 'theoria generationis,' alleging that the formation of flower and fruit is due to failing energy in the plant; that all modifications have origin in the gradual withdrawal of vegetative power, which diminishes in amount as growth continues, and finally vanishes altogether. What Wolff hoped might be science, has been forgotten; what he lightly esteemed, is science, — fact not without significance, and certainly not without parallel in the history of intellectual work.

But if Wolff did not appreciate what he had accomplished, neither did any of his contemporaries. The seed fell not into good ground. The great Haller was yet living and working, at once botanist, anatomist, and poet; but he saw not the truth, although certainly familiar with Wolff's writings. The Jussieus were busy in Paris, arranging and re-arranging in the Jardin des plantes; but they heard nothing of Wolff: the time was not yet. The scientific vision of the age, dazzled by a sudden discovery of Nature's richness and variety, was not yet ready to be concentrated upon any single problem, however interesting that problem might be in statement, or far-reaching in outcome and solution. T. H. McBride.

VELOCITY AND SEDIMENT.

The observations on velocity and sediment on the Mississippi River, from Cairo to the head of the Passes (1,060 miles), have not confirmed the conclusion of Mr. Login, in 'The benefits of irrigation in India,' regarding the relation between these two functions of flowing water. His conclusion is thus stated: "The author believes that the power of water to hold matter in suspension is directly as the velocity, and inversely as the depth. It is also suggested that water in motion rolls rather than slides, and that it is owing to this rotary motion that water has the power to hold matter in suspension; further, that, with given velocities and defined depths, only a certain quantity of matter can be held in suspension, whatever may be the character of the bed or bank of the river or canal. If the velocity be increased, and the depth remain constant, scour will take place. If the velocity be decreased, and the depth is the same, there will be deposit."

The suggestion 'that water in motion rolls rather than slides,' is valuable as explaining the 'inner movements of the particles of water among themselves,' which are aggregated in the indirect currents found even in carefully prepared beds, which are symmetrical, smooth, and straight. These movements were well illustrated by Mr. Francis, in a series of experiments at Lowell in 1867, by mixing whitewash with the clear water of an artificial channel. But the movements of mass inaugurated by the relative movements of the particles of water among themselves appear too feeble to account for the immense quantities of sediment observed in suspension in great alluvial rivers. It also seems clear, as concluded by Mr. Herschel, in his paper on the erosive and abrading power of water, "that direct friction tends to drag materials along the bed, or down the banks, if these have a sufficiently steep side-slope," and that "the effect of the simple friction of a stream upon its bed and banks is not a source of danger: its action is very slow, and it has never been shown to be of a dangerous character in any instance." Certainly the sedimentary grains have no power of motion independent of the water surrounding them; and friction against a smooth bed could not impart such vertical movement to the water as is necessary to lift these grains, except in the slight degree that may result from the movement of the particles of water among themselves. The conditions that prevail in natural stream-beds are necessary for a great suspension of sediment. The projections, inequalities, and sinuosity of such beds expose the material composing them to the impact of the current rather than to simple friction, and also cause those extreme indirect movements of large masses of water that, in great rivers, develop whirls, boils, and eddies, and which alone are capable of lifting numerous and coarse grains of silt, sand, and even gravel. When a 'boil' rises in the Mississippi River, the surface may be raised many inches, and the charge of sediment so dense, that it is seen to roll away from the crater in cloud-shaped masses.

The suspension of sediment is, then, only an indirect result of the velocity, depending more directly upon the character of the bed — its symmetry, smoothness, and straightness, — than upon the velocity, or the relative depth of its different reaches and stages.

The amount of sediment suspended throughout the Mississippi River appears, however, more controlled by the tributary most largely supplying its volume at the time than upon any or all other causes. It was noticed by Capt. Brown, U. S. corps of engineers, that "the Missouri was one of the greatest contributors of sand to the Mississippi River," observably even in the South Pass, 1,300 miles below its mouth.

The apparent anomalies in the following table are largely explained by the relative discharge of the Missouri and the clear-water tributaries. It will be observed that frequently the aggregate bulk or weight of sediment passing per second (2 × sediment in each foot) is greater at or below a mean stage than it is at the maximum.

In this table the velocity is divided into half-feet per second; and in the other columns are given the number of periods during the series of observation in which each rate prevailed, the number of separate measurements taken in each period, and the mean quantity in each period at each rate of velocity.

Fulton, Nov. 27, 1879, to Oct. 12, 1880, Mississippi River commission.

Velocity, feet per second.	Periods at each rate.	No. of observations.	Mean mgr. of sediment in 500 c.c.	Velocity, feet per second.	Periods at each rate.	No. of observations.	Mean mgr. of sediment in 500 c.c.
2.0 @ 2.5	1st	11	339	5.5 @ 6.0	1st	1	235
	2d	14	361		2d	1	530
2.5 @ 3.0	1st	9	511		3d	8	536
	2d	4	311		4th	1	355
	3d	5	434		5th	2	915
3.0 @ 3.5	1st	4	311		6th	3	813
	2d	6	647	6.0 @ 6.5	1st	1	335
	3d	9	524		2d	1	200
3.5 @ 4.0	1st	1	290		3d	6	317
	2d	8	271		4th	1	380
	3d	4	754		5th	1	275
4.0 @ 4.5	1st	3	215		6th	5	1,062
	2d	4	386		7th	1	840
	3d	4	281	6.5 @ 7.0	1st	1	410
	4th	12	538		2d	1	260
	5th	2	825		3d	1	180
4.5 @ 5.0	1st	2	240		4th	4	600
	2d	2	460		5th	1	1,085
	3d	4	439	7.0 @ 7.5	1st	3	400
	4th	5	777		2d	3	562
	5th	3	758		3d	2	140
5.0 @ 5.5	1st	1	390	7.5 @ 8.0	1st	1	325
	2d	2	885		2d	2	145
	3d	3	908				

From the theory of Mr. Login, before quoted, the inference is drawn, that when flowing water is saturated, or loaded in proportion to its velocity with sediment, the erosion and caving of banks will cease. In this is involved the assumption that the erosive power is that of friction rather than of impact. Surveys have been made by the Mississippi River commission which show the relative amount of caving on the right and left banks below Cairo. In this part of the river the line of demarcation between the muddy discharge of the Mississippi, following the right or west bank, and the clear water from the Ohio along the left or east bank, is apparent at times to the eye for twenty or thirty miles, and to the sediment trap for ten times this distance. At Columbus, twenty miles below Cairo, the amount of sediment per unit of measure has been observed three or four times greater on the west than on the east side of the river. But these comparative surveys show that the caving on the right or west bank, washed by the muddy water, is greater, both in length of bank and in area and bulk, than it is on the opposite shore, where the water is undercharged with sediment. The length of river from which this conclusion is drawn (230 miles) is thought to be great enough to eliminate any local or abnormal influences on velocity, or material of bank.

B. M. HARROD.

AMERICAN CLIMATOLOGICAL ASSOCIATION.

THE second annual session of the American climatological association was held at the hall of the Academy of medicine in New York, May 27 and 28; the president, Dr. A. L. Loomis, in the chair. This association was organized a year ago in Washington, for the study of climatology and diseases of the respiratory organs.

In the opening address, on the afternoon of the 27th, the president expressed the opinion that the scope of the society's work ought to be enlarged, so as to include the study of affections of the vascular system and other diseases, as well as to investigate more systematically the subjects of sanitaria and of mineral springs. This suggestion was afterwards adopted.

In Europe the study of these subjects had gone much farther than in America, and it was becoming more and more common for European physicians to treat their patients by prescribing residence for greater or less time at sanitaria especially adapted to their diseases. That such was not the case in America was not due to the lack in this country of the climates which possessed the necessary beneficial qualities, but to the lack of systematic study of the subject by the medical profession, as well as to the imperfect provision for the wants of invalids at our health resorts. The attempt to remedy these deficiencies was one of the main objects of the association.

As a model of what was desirable to encourage in the way of sanitaria, the president described one in the Adirondacks, devised to meet the wants of invalids of limited means, where, for a small sum, accommodation is provided in cottages for two or four patients, with a common dining-hall; also tents, etc., for those who are able to camp out; the whole under the charge of a medical board and an attending physician.

After speaking of the causes of pulmonary phthisis, Dr. Loomis said that the objects to be accomplished in the treatment of the disease are two, — to improve the general condition of the patient; and to stop the local disorder in the lungs, preventing the entrance and multiplication of the bacilli tuberculosis. Good climate is a potent means of accomplishing both these ends. Good climate means pure air, and it must be determined by clinical experience.

The amount of moisture in the atmosphere is not an index; for the only dampness injurious to the phthisical patient is that exhaled from the soil, laden as it is with organic matter. The nature of the soil is therefore of prime importance. It must be light and porous, admitting of good drainage. A clayey soil is necessarily bad.

Dr. Beverly Robinson of New York read a paper on antiseptic inhalations, instancing cases in which he had obtained decided benefit, especially in the way of alleviating cough by this method of treatment. The vapor of antiseptics was applied by means of a respirator worn over the nose or mouth, or both, from one to two hours a day in some cases, and nearly all the time in others.

'Catarrhal affections of the nasal cavities as a cause of pulmonary phthisis,' was the title of a paper by Dr. W. C. Jarvis of New York. The position taken was, that consumption can be traced, in many instances, to a catarrhal condition of the larynx, which in its turn is induced by the irritating effect of the discharges from the pharynx and nasal cavities, the catarrhal condition in this situation being due to a deflected nasal septum. In the discussion which followed, it became evident that the members present were not in accordance with Dr. Jarvis's novel views.

The event of the evening session was the presentation, by Dr. H. F. Williams of Brooklyn, of his pneumatic cabinet, with histories of cases of consumption treated therewith. The cabinet consists of an air-tight iron safe, with a plate-glass front, perforated near the middle with an opening about an inch in diameter, through which passes a rubber tube, so arranged that the patient can hold the end of it in his mouth as he sits upon a low stool in the cabinet. When the cabinet is closed, this tube forms the only means of communication with the external atmosphere. The patient having taken his seat, and placed the end of the tube in his mouth, the door of the cabinet is closed, and the air within slightly rarified by means of a few strokes of an air-pump. By this process the body is surrounded by a rarified atmosphere, while the respiratory passages are in communication with the outer air: the patient is therefore breathing from an atmosphere of greater density than that surrounding his body, with the effect of expanding the chest, bringing the lower part of the respiratory organs into play, and affording valuable exercise of muscles of respiration. Dr. Williams also claims that with its aid antiseptic sprays and vapors can be carried much deeper into the lungs than by any other method. The paper and demonstrations excited much interest, and a number of gentlemen expressed them-