SCIENCE

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INFANTS' MOVEMENTS.

In an earlier article,[1] I had occasion to speak of certain phenomena of the infant's muscular development — the phenomena which illustrate the principle of suggestion. A brief survey of certain general characters of these early movements may now be made.

From the outset, movement is the infant's natural response to all influences. And, more than this, Bain and Preyer seem to have made out their case, that from the outset there are movements which are spontaneous, due to unsolicited discharge of the motor centres. At any rate, no observation made after birth can decide the question one way or the other. It remains for the embryologists to continue their work, and this is where Preyer's results get their principal value.

In regard to movements more properly reflex and responsive, I may record a few detached observations on my child. Carefully planned experiments with her, made in the ninth month, showed the native, walking reflex — alternative movement of the legs — very strongly marked. I held her by the body, having made the legs quite free, in a position which allowed the bare feet to rest lightly upon a smooth table. The reflex seemed to come somewhat suddenly, for up to the middle of the eighth month I could not discover more than a single alternation; and this I had determined not to take as evidence, since it could well arise by chance. But, in the ninth month, I observed as many as three and four well regulated alternations in succession. At first most of these movements were the reverse of the natural walking movements, being oftenest such as would carry the child backward. This, however, passed away. I have the following note on June 13, 1890 (the child being one day short of nine months old): "Walking movements, 3 to 4 alternations, backwards oftenest, but tending rapidly to forward movements; later, 2 experiments, each showing 3 to 4 alternations forwards very plainly;" and on June 19: "Fine activity in walking — good alternations, but more backwards than forwards — clearly reflex, from stimulus to the soles." It is easy to see that this backward alternation might be due to some accident of stimulation or discharge when the reflex was first called out; a tendency which early efforts at creeping would soon correct. Yet in H.'s case, it was so marked that for a period she preferred to creep backward.

A few observations were made also upon bilateral reflexes. A gentle touch with finger or feather on the cheek, or beside the nose, or upon the ear, when H. was sleeping quietly upon her back, called out always the hand on the same side. After two or three such irritations, her sleep became troubled and she turned upon the bed, or used both hands to rub the place stimulated. Tickling of the sole of the foot also, besides causing a reaction in the same foot, tended to bring about a movement of the hand on the same side. These observations, not a large number, were made in the sixth, seventh, and eighth months.

A reference has already been made to the late rise of real phenomena of imitation. In support of the assertion, that imitation is rather late in its rise, the following experiences may be reported. As a necessary caution, the rule was made that no single performance should be considered real imitation unless it could be brought out again under similar circumstances. It is probable that cases of imitation recorded as happening as early as the third month are merely coincidences. For example, I recorded an apparent imitation by H., of closing the hand, on May 22 (beginning of the ninth month), but on the following day I wrote, "experiment not confirmed with repeated trials running through four succeeding days." H.'s first clear imitation was (May 24) in knocking a bunch of keys against a vase, as she saw me do it, in order to produce the bell like sound. This she repeated again and again, and imitated it a second time a week later when, from lapse of time, she had forgotten how to use the keys herself. But on the same day (May 24), other efforts to bring out imitation failed signally, i.e., more or less articulate sounds, movements of the lips (Preyer's experiments), and opening and closing of the hands. Ten days later, however, she imitated closing the hand on three different occasions. And yet a week afterward, she imitated movements of the lips and certain sounds, as *pa*, *ma*, etc.[1] From this time forward the phenomenon seemed extended to a very wide range of activities, and began to assume the immense importance which it always comes to have in the life of the young child. It may be noted that H.'s first clear imitation plainly involved a complex voluntary muscular performance; and as far as a single instance is of value, it shows that the will may get control of certain muscular combinations before they are called out to a great extent involuntarily. In this respect, also, my observations confirm Egger's.[2]

In order to test the growth of voluntary control over the muscles of the hand and fingers, I determined to observe the phenomena of H.'s attempts at drawing and writing, for which she showed great fondness as soon as imitation was well fixed. Selecting a few objects well differentiated in outline — animals which she had already learned to recognize and name after a fashion — I drew them one by one on paper and let her imitate the "copy." The results I have in a series of "drawings" of hers, extending from the 7th of last April (the last week of her nineteenth month) to the present (middle of the twenty-seventh month). The results show that, with this child, up to the beginning of the twenty-seventh month there was no connection apparent between a mental picture in consciousness and the movements made by

[1] Science, xvii., 1891, p. 113.

[1] Egger notices this late development of vocal imitation, "L'Intelligence et Langage chez les Enfants," p. 18.

[2] Loc. cit., p. 18–20. Yet I cannot hold with Egger that imitation always involves "intelligence."

the hand and fingers in attempting to draw it. The "drawing" was simply the vaguest and most general imitation of the teacher's movements, not the tracing of a mental picture. And the attempt was no better when a "copy" was made by myself on the paper—a rough outline drawing of a man, etc. There was no semblance of conformity between the child's drawing and the copy. Farther, while she could identify the copy and name the animal, she could not identify her own effort, except so far as she remembered what object she set out to make.

But in the next week (early in the twenty-seventh month) a change came. I drew a rough human figure, naming the parts in succession as they were made: she suddenly seemed to catch the idea of tracing each part, and she now for the first time began to make figures with vertical and horizontal proportion; i.e., she followed the order she saw me take: head (circle), body (ellipse) below, legs (two straight lines) further below, hands (two lines) at the sides of the body. It is all done in the crudest fashion, but that is due to the lack of muscular co-ordination. With the simplification of the figure by breaking it up into parts came also the idea of *tracery imitation*, and its imperfect execution.

As yet, however, it is limited to two or three copies — objects which she sees me make. That it is not now simply imitation of my movements is evident from the fact that she does not imitate my movements: she looks intently upon the figure which I make, not at my movements, and then strives to imitate the figure with movements of her own very different from mine. But she has not generalized the idea away from particular figures, for she can not trace at all an altogether new figure in right lines. Further, she traces these particular figures just as well without written copies before her: *here, therefore, is the rise of the tracery imitation of her own mental picture* — a fact of great theoretical interest.

This illustrates again the point so strangely overlooked by writers on the rise of volition that the earliest voluntary acts are not voluntary movements. The thing pictured and willed here is not a movement, it is a figure — man, bird, dog. This figure suggests (stimulates) its motor associates. It is only later that the muscular movement becomes conscious end.

In the nature of the movements which the child has made in this series of drawings there is a marked change and development. There is growth from angular straight lines to curves, from movements one way exclusively to reverse movements, and an increasing tendency to complex intricate figures, which last probably results from greatly increased ease, variety, and rapidity of movement. At first she made only sweeping "arm-movements," then began to flex the wrist somewhat, and now, with no teaching, she manipulates the pencil with her fingers considerably. This seems to give support to the opinion of professional writing-teachers that the "arm-movement" is most natural and effective for purposes of penmanship.

Further, all her curves are made by movements from left to right going upward and from right to left downward. This is the method of our usual writing as contrasted with "backhand." She also prefers lateral to vertical movements on the paper. Her most frequent and easy "drawing" consists of a series of rapid right-and-left strokes almost parallel to one another.

J. MARK BALDWIN.

A FEW CHARACTERISTICS OF THE AVIAN BRAIN.[1]

WHEN we compare the brain of a crow or a titmouse with the brain of a snake or a turtle, it is no longer a marvel that birds bear towards their reptilian cousins the relation of intellectual giants to intellectual dwarfs. The cranium of reptiles is small, while the brain-cavity of birds is large, and, what is more pertinent, the whole of that cavity is filled with a compact brain mass. Not only that, but the cerebrum, the seat of the intellectual faculties, constitutes the major portion of that mass.

The cerebrum is composed of two lateral halves or hemispheres, which are so situated that they form a compact heart-shaped mass. The apex of this heart is directed towards the bill of the bird, while the notch is directed towards the tail. These hemispheres are unconvoluted, but the borders of some of the superficial lobes approach almost to the dignity of convolutions. Furthermore, a microscopic study of the brain reveals the fact that occasionally there occurs a blind convolution; i.e., an internal projection of gray matter without a concomitant surface convolution.

A microscopic study of the bird brain does not reveal a cerebral cortex similar to that of the human cerebrum. Here the cerebral cortex is represented by a thin hull containing several loosely aggregated cell-clusters. These cell clusters are constant and are homologous to corresponding clusters in the lizard brain.

Next in size to the cerebrum comes the cerebellum. Not only is it transversely convoluted, not only is it a cover for the medulla, but it is also partly wedged into the notch between the two halves of the cerebrum. This high development of the cerebellum of birds, coupled with the corresponding high development of the cerebellum of fishes, is a strong argument in favor of the hypothesis that the cerebellum functions as a co-ordinating centre for muscular movements.

Neurologically considered, birds are pre-eminently seeing animals, and all parts that appertain to vision are highly developed. The optic nerve is the largest cranial nerve, and the optic lobes are completely differentiated bodies. Even the third, fourth, and sixth cranial nerves, although quite small, are relatively larger than the corresponding nerves of the mammalian brain.

An extraordinary development of one set of organs is never accomplished but at the expense of some other set. In this case the organs of the sense of smell have been the martyrs. Although in the lower avian types the olfactory lobes are paired and conspicuous, yet in the highest types of birds they have been reduced to a small unpaired body which is partly imbedded in the base of the cerebrum.

These two facts lend support to the view that birds of prey find their food more by aid of the sense of sight than by aid of the sense of smell. The birds of prey are far from the lower end of the scale, and in all cases examined the olfactory lobes have been relatively smaller than the corresponding lobes of chickens, geese, turkeys, etc. I have not yet examined a buzzard's brain; but, judging by the figures of A. Bumm,[2] they have small, inconspicuous olfactory lobes.

From the above statements, we see that economy of space is evidenced in all parts of the avian brain. Indeed "progressive compactness" has played so important a part in the evolution of birds that there is a vast difference between the

[1] This is but a brief abstract of a portion of my paper upon the "Morphology of the Avian Brain," Journal of Comparative Neurology, vol. I., pp. 39-92, 107-134, 265-286, pl. V.-VIII., XIV.-XVI., XVIII.

[2] Das Groshirn der Vögel, Zeitschrift f. Wiss. Zoologie, Bd. xxxviii., 1883.

lowest avian brains, with their large projecting olfactory lobes and uncovered optic lobes, and the highest avian brains, with their small, inconspicuous olfactory lobes and covered optic lobes. The difference between these two extremes is almost as great as that between the brain of a lizard and the brain of the lowest type of birds. Yet there is no impassable gulf between these two extremes. All the intervening stages are supplied by the brains of the various avian groups. In reviewing this remarkable sequence, we are almost forced to believe that this tendency towards a progressive compactness of the brain existed long before the first bird was evolved. If this be true, then this tendency towards a progressive compactness of the brain, combined with a tendency to develop all parts appertaining to vision and to atrophy all parts appertaining to smell, will account for all the major differences between the avian and the reptilian brain.

Furthermore, within this class of animals, this "progressive compactness" of the brain is a factor of taxonomic importance. So far at least as major groups are concerned, a classification based upon it alone is, for the most part, in harmony with those classifications that are based upon other structural elements of birds.

Histologically considered, the bird brain is composed of nerve fibres, nerve cells, and neuroglia. Excepting the fornix and hippocampal commissures, all the principal commissures of the mammalian brain, corpus callosum included, are found in the avian brain. Poverty of space causes the omission, in this abstract, of the various other tracts of the bird brain.

Although in the bird brain the nerve cells present a great diversity of forms, yet they may all be grouped in the following classes: ganglionic cells, Deiter's corpuscles, fusiform or flask cells, pyramidal cells, and multipolar cells. The ganglionic cells are large bi-polar cells, which are never found outside of the root ganglia. Each extremity of the cell is prolonged into a nerve fibre. One fibre passes into the brain, the other into a nerve. In addition to the ordinary cell wall, each of these ganglionic cells is surrounded by a special nuclei-bearing sheath. Deiter's corpuscles are small cells, which are supplied with so small an amount of protoplasm that ordinary preparation reveals nothing but their nuclei. These minute cells are universally distributed. In the cerebellum, however, they are densely aggregated in a single lamina; while in the optic lobes they are densely aggregated in several concentric laminæ. The remaining three types are encountered throughout the brain; but in any single nidulus some type always predominates, often to the exclusion of the other two. The flask cells resemble a flask in shape, and when stained each cell presents a faintly stained nucleus, within which is a densely stained nucleolus. Such cells are supposed to function as sensory cells. The pyramidal cells are sub-pyramidal in outline. These cells stain densely, when each one presents a densely stained nucleus, within which is a densely stained nucleolus. Such cells are probably motor in function. The multipolar cells resemble distorted, many-branched, pyramidal cells. Such cells probably act as switch stations for nervous energy.

University of Cincinnati, Dec. 31, 1891. C. H. TURNER.

A NEW SABRE-TOOTHED TIGER FROM THE LOUP FORK TERTIARY OF KANSAS.

IN a collection of Loup Fork Tertiary fossils obtained by the writer from northern Kansas, is a right upper canine of *Machœrodus*, apparently different from that of any of the known species of that genus.

The remains of several feline animals have been described from the Loup Fork, one of them (*Felis maxima*, Scott) being the largest of all known *Felidæ;* but none referred to the genus *Machœrodus* has been announced. It may, however, yet appear that the *F. maxima* itself, which Professor Scott has but provisionally referred to the genus *Felis*, is a machærodont.

The Loup Fork canine includes the entire root and neck and the basal portion of the crown. As nearly as it is possible to judge, it represents an animal about as large as the puma, but it must be borne in mind that the size of an animal cannot be very positively and closely estimated from a part so highly specialized and so subject to variation in the ratio of its size to that of the body as is the canine in this genus. In any event, the tooth indicates an animal smaller than any of the known American Pleistocene species, unless it be *M. gracilis*, Cope, and considerably larger than the European Miocene *M. palmidens*, de Blainville.

As compared with the larger American species of *Machœrodus* (*M. necator*, etc.), *M. gracilis* is characterized by the more compressed form of the basal portion of the upper canine; and this compression is said to be a marked feature. In the Loup Fork species, on the contrary, that tooth has greater relative thickness than in *M. necator*, the thickness of the tooth, at base of crown, being related to its breadth as 1 to 1.65, while the corresponding ratio in *M. necator* (taken from Cope's illustrations) is 1 to 2.2. In *M. neogœus* the ratio, derived from the measurements given by Burmeister, is 1 to 2.33.

The Loup Fork species may be known as *Machœrodus crassidens.*

The canine of *M. crassidens* presents a gentle curvature and has its posterior cutting edge compressed and denticulated. Whether the anterior border was of similar character is uncertain. The form of a point-like downward prolongation of the surface of fracture on the anterior border of the crown may have been determined, when the tooth was broken, by the presence of a compressed border, but, if so, the contour of the preserved part of the crown does not indicate it. It is, at least, certain that a denticulate carina did not extend so far from the apex on the anterior as on the posterior border.

DIMENSIONS.

	Inches.
Breadth of crown of canine at base	1.14
Thickness of same	.69
Breadth of crown 1.5 inches above base (about)	.83
Thickness of crown at same (about)	.46
Length of root of canine (to origin of denticulated keel)	2.44
Length of canine, as restored (approximate)	5.45

Should new material prove that only the posterior margin of the canine is denticulated, the species would, in this respect, resemble the *Machœrodus nestianus* of the upper Pliocene of Italy. F. W. CRAGIN.

Colorado Springs, Col.

NOTES AND NEWS.

THE Pennsylvania State Board of Health, at the instance of the Governor of Pennsylvania, has issued an invitation to the other State and the more important city boards of health, and to the American Public Health Association, to join in a conference with the officers of the World's Columbian Exposition at the city of Chicago, with the view to making an exhibit of the objects, methods, and results of the work of sanitary officials in this country.

— Mr. Charles S. Peirce has tendered his resignation as Assistant in the United States Coast and Geodetic Survey, to take effect Dec. 31. Mr. Peirce was first attached to the Survery about thirty

years ago. During the greater part of the time he has had charge of its operations relating to the determination of the force of gravity. Some of the results of his investigations have been published as appendices to the Annual Reports and have embodied contributions of great importance to science. It is understood that Mr. Peirce will continue to furnish the Survey from time to time special discussions of topics related to the subject to which he has devoted so many years.

— The routes, both northern and southern, now formally adopted by the principal transatlantic steamship companies are shown on this month's Pilot Chart issued by the United States Hydrographic Office. The northern routes remain in force until the middle of January, but steamers that take their departures from Sandy Hook Light-vessel, Boston Outer Light, Fastnet, or Bishop's Rock, on or after the 15th, follow the southern routes, which then remain in force till the middle of July next. As stated last month, on the chart, five steamship companies (the Cunard, White Star, Inman, Guion, and National) have adopted these routes to and from the Fastnet, and the following companies have now come into the agreement (taking the great circle between Bishop's Rock and the Banks): North German Lloyd, Hamburg-American, Companie Générale Transatlantique, and Red Star. It will be remembered that the Pilot Chart recommended that the Channel steamers adopt the same routes (west of the 20th meridian) as the Queenstown steamers, but these companies have decided to follow the great circle direct to the Grand Banks. The objection to this course is that the region within which eastward and westward bound vessels are liable to encounter one another is broader than in case the point of junction is shifted farther east, say to the 20th meridian, while the distance saved is comparatively slight (only six miles for the northern and nine miles for the southern routes). Possibly at some future time a compromise will be made by which the junction will be fixed at some point that may be mutually agreed upon (say about the 15th meridian in latitude 51° north). Until such an arrangement is made by the companies interested, the routes already adopted and actually in force will be shown on this Chart.

— A correspondent of the London *Spectator*, writes os follows: I have studied the habits of the scorpion for many years, and have often noticed how very sensitive scorpions are to the most delicate sound, musical or otherwise. Under the thorax the scorpion has two comb-like appendages, which are the antennæ (pectinatæ). It is pretty well settled by physiologists and entomologists that in insects the antennæ represent the organs of hearing. These delicate structures are easily affected by the vibrations of sound, and there can be no doubt whatever that they are also affected by sounds quite inaudible to the human ear. The slightest vibration of the atmosphere, from any cause whatever, at once puts in motion the delicate structures which compose the antennæ, to which organs insects owe the power of protecting themselves against danger, as well as the means of recognizing the approach of one another. Spiders have wonderful eyesight, but I am quite sure that the scorpion's vision, notwithstanding his six eyes, is far from being acute. It is very difficult to catch a spider with a pair of forceps, but a scorpion can be easily captured, if no noise is made. Spiders see their prey before they are caught in the web; but the scorpion makes no movement whatever to seize flies or cockroaches until they indicate their whereabouts by movements. This being the case, it can readily be understood how easily the scorpion may be roused into motion by the vibrations of music, as described in the article alluded to. If a tuning-fork be sounded on the table on which I keep my caged scorpion, he at once becomes agitated, and strikes out viciously with his sting. On touching him with the vibrating tuning-fork, he stings it, and then coils himself up, as scorpions do when hedged in. In Jamaica, the negroes believe that scorpions know their name; so they never call out, "See, a scorpion," when they meet with one on the ground or wall, for fear of his escaping. They thus indirectly recognize the scorpion's delicate appreciation of sound; but if you wish to stop a scorpion in his flight, blow air on him from the mouth, and he at once coils himself up. I have repeatedly done this; but with a spider it has a contrary effect. Music charms a snake into silence, as the experiments at the Zoo and elsewhere prove; but the agitated contortions and writhings of the scorpions when roused by the sound of the violin only prove that they are roused by the vibrations of sound caused by music, and this would happen if they were disturbed by the discordant sounds of a penny trumpet or any other unmusical instrument.

— At the recent French Surgical Congress MM. Henocque and Bazy reported the results of a series of examinations of the blood with the spectroscope made on persons who were compelled to undergo surgical operations. According to these investigations the demonstration of the quantity of hæmoglobin in the blood affords the surgeon some valuable information in cases where it is necessary to decide whether the patient's health is sufficiently good to permit of the performance of an operation which may not be urgently required. In ovariotomies and laparotomies undertaken for the removal of tumors it is of advantage to determine the degree of anæmia and the condition of nutrition by this method, so that the operator may be able to select the most favorable time for operation. The authors also made, according to the *International Journal of Surgery*, some exceedingly interesting experiments with the view of studying the effects of chloroform anæthesia upon the quantity of oxy-hæmoglobin in the blood and upon tissue metamorphosis. These investigations were carried on before, during, and after the performance of surgical operations. It was demonstrated in eight cases of major operations that chloroform actually tends to augment the quantity of hæmoglobin in the blood, unless a condition of asphyxia is produced, and that this quantity may remain stationary despite severe losses of blood. One of the constant effects of chloroform anæsthesia, however, is to retard the reduction of oxy-hæmoglobin; that is to say, it decreases tissue metamorphosis. These phenomena therefore illustrate that chloroform does not exert a toxic influence on the blood, although it has a marked effect in retarding the vital chemical processes in the body. In cases of sudden death at the commencement of chloroform anæsthesia a complete arrest of tissue metamorphosis takes place, and to this, in the authors' opinions, should be attributed the extraordinary severity of this form of syncope. They also believe that these facts demonstrate the advantage of determining before operation whether an individual tendency to retarded tissue metamorphosis be present. In striking contrast to the results obtained by MM. Bazy and Henocque, however, Dr. Mikulicz found that the prolonged administration of chloroform produced a decrease of hæmoglobin even in operations unattended with loss of blood. This fact simply illustrates the wide discrepancy in the results obtained by different investigators of the same subject.

— In a bulletin just published by the Entomological Division of the Cornell University Experiment Station, Professors J. H. Comstock and M. V. Singerland report upon a series of experiments, continued for three years, the object of which was to discover a practical method of preventing the ravages of wireworms. Some of the results of these experiments are summarized as follows: Grains of corn were coated with a flour paste containing Paris green and planted. The only apparent result was to retard the sprouting of the seeds, the wireworms apparently thriving upon the poisoned paste. The rose bug is another insect which it is practically impossible to kill with Paris green. Coating the seed corn with tar or soaking in salt brine, copperas solution, kerosene oil, or turpentine interfered with germination much more than it did with the appetite of the wireworm. Soaking in strong solution of strychnine failed to render the corn either distasteful or destructive to the worms. Starvation was found to be as ineffectual as feeding on poison, as the soil was kept entirely bare of vegetation for an entire season without reducing the number of worms. Buckwheat, Chinese mustard and rape have been recommended as crops upon which wireworms will not feed, but in these experiments the worms lived and thrived as well upon the roots of these plants as they did upon those of timothy and clover. Kerosene oil, crude petroleum and bisulphide of carbon were applied to the soil as insecticides, the kerosene and petroleum being also used in the form of emulsions. They killed the wireworms when applied in sufficient quantity to destroy all vegetation also.

Their use was found impracticable on account of the cost. Many farmers believe that salt either kills wireworms or drives them deeper into the soil beyond the roots of crops, and a series of carefully planned experiments were made to test this theory. The results showed that in order to destroy wireworms salt must be used at the rate of about eight tons to the acre, or over one per cent of the soil to a depth of four inches must be salt. Half a ton of salt to the acre was found sufficient to prevent one-half the wheat from germinating, and four tons per acre, applied in July, killed all the grass in a few days. In soil salted at the rate of 1,000 pounds per acre the worms were found, after some months, as numerous and as near the surface as in unsalted soil. Kainit, a German potash salt now used extensively as a feltilizer, has been supposed to be useful in exterminating wireworms, and the syndicate which is pushing the sale of Kainit in this country make great claims on this score ; but in the Cornell experiments four to nine tons of Kainit per acre produced but little if any effect upon the wireworms in the soil. Other potash salts gave no better results. Lime, applied at the rate of 200 bushels per acre, had no effect upon the wireworms. Chloride of lime, used at the rate of nearly six tons per acre (costing about one hundred dollars per ton), was found to be quite effective. Gas lime, applied fresh and at the rate of twenty to forty tons per acre, proved partially effective. Trapping by baits produced the only results that gave any encouragement, but these baits caught, not the wireworms, but its parent, the click-beetle. The most satisfactory trap was a wad of fresh clover, dipped in Paris green water and placed under a board. These experiments were made in cages in such manner that the conditions could be absolutely controlled and the results accurately determined. Their negative results may be of great value to farmers by preventing the waste of time and money in trying useless methods of prevention. The only hope of a practicable remedy the investigators hold out to the farmers is that by fall plowing the worms may be disturbed at a critical period of their existence, when disturbance means death. They recommend plowing as soon as possible after wheat harvest, pulverizing immediately and thoroughly with the harrow, and seeding with wheat or rye in September, followed by not more than one or two crops of grass or clover, this to be plowed under in the summer as before. It will take several years of this method of short rotations to exterminate the worms, as they live for three years in the worm stage, and can only be injured by plowing at a certain period, but farmers who practise this method have little or no trouble from wireworms.

— At the recent annual meeting of the American Folk-Lore Society, in Washington, D. C., Rev. J. Owen Dorsey read a paper, entitled, "Nanibozhu in Siouan Mythology." At the previous annual meeting of the Society (in New York), a paper was read by Professor A. F. Chamberlain of Clark University, on "Nanibozhu among the Otchipwe, Mississagas, and other Algonkian Tribes." (*Journal American Folk-Lore*, for July–September, 1891, pp. 193–213). Mr. Dorsey's paper was designed to show the points of agreement and difference (so far as Nanibozhu is concerned) in the mythologies of the two linguistic stocks of families, the Algonkian and the Siouan. In the preparation of Mr. Dorsey's paper, the author consulted the myths of the Omahas, Ponkas, Kansas or Kaws, Osages, Iowas and Otos, all of which were collected by himself for the Bureau of Ethnology, and the Dakota myths of the late missionary, S. R. Riggs, and those in the Bushotter collection, these last consisting of two hundred and fifty-seven texts written by an Indian in the Teton dialect of the Dakota language. In Algonkian mythology, Nanibozhu, Manabush, or the Great Hare (sometimes called the Manito of winter), is a single character, easily identifiable. But in Siouan mythology we find several characters, each one of whom resembles the Algonkian Nanibozhu in one or more respects. The principal characters thus known to the Omahas and Ponkas are the following : 1. The Rabbit, the great friend of the Indian race (answering to the Badger in Dakota mythology). 2. I shti-ni-ke, the enemy of the Rabbit, the great Deceiver, a malevolent being. His Dakota counterpart, I-kto or I kto-mi in Teton, and Un-kto mi in Santee Dakota, is often a clown, a "jolly good fellow" deceived by the Rabbit, malevolent on some occasions. The Omahas call I-shti-ni-ke the "Black Man," and they and the Ponkas now apply his name to any species of ape or monkey. The Dakotas give the name of Ikto or Unktomi to the spider. 3. Ha-ghi-ge, a very cunning person, who wounds two water gods in order to avenge the death of his little brother, meets I-shti-ni-ke, when the latter is disguised as He-ga, the Buzzard, learns his secret power, and then kills him; kills the water gods whom he had wounded; is chased by the other deities, but escapes by becoming a large rock; restores his brother to life for a season; and has other adventures. The other characters who resemble Nanibozhu are as follows: In Dakota myths, the Badger figures instead of the Rabbit, and the Blood-Clots Boy takes the place of the Rabbit's son, the orphan and Wears-a-plume-in-his-hair. In the myths of the Omahas it is the orphan who kills I-shti-ni-ke, but the Ponkas refer that act to the Rabbit's son. Wears a-plume in-his-hair was the conqueror of the "Bad Men," magicians, three of whom he killed; he sought the survivor, but did not recognize him in his disguise as a beautiful woman. The woman induced the hero to rest his head in her lap, and while he slept she changed him into a mangy dog, and took the hero's shape. In the course of time, the hero was restored to his own shape. He changed the bad man into a dog, and then killed him. The Omaha and Ponka myths referred to in this paper are given in full in their respective originals (with free and interlinear translations) in "Contributions to N. A. Ethnology," Vol. 6, which has just been published. The paper on Nanibozhu will probably appear in a future number of the *Journal of American Folk-Lore*.

— In a recent number of *The Illustrated American* is an illustrated article on the Museum of Natural History at South Kensington, which was first thrown open to the public on Easter Monday, 1881. Some years ago the British Museum had become so overstocked in certain departments that it was deemed necessary to erect another structure, to contain all objects connected with natural history, and Parliament voted three hundred and ninety-five thousand pounds (nearly two million dollars) for the purpose. Alfred Waterhouse was the architect chosen to carry out the work. The architecture may be termed Decorated Norman, and in some respects it is unique. The whole edifice is cased with terra cotta, and the doorways and windows are ornamented with columns designed from objects of natural history—two features that have provoked much criticism. It has been charged, says *The Illustrated American*, that the tint of the terra cotta is not suitable for making the various articles in the museum stand out in relief; that it was a mistake to bring in close proximity the real objects of natural history and the conventional representation of them adopted by architects; and that the crowding together on the same column or moulding representations on one scale, of microscopic and gigantic organisms, inhabitants of sea and land, was unwarrantable in a building designed for educational purposes. Complaint has also been made that the great hall is semi-ecclesiastical in style. The south front of the building is six hundred and seventy-five feet long. There are three stories, in addition to the basement. The central hall is one hundred and fifty feet long, ninety-five feet wide and sixty feet high. Along its two sides are twelve arched recesses. The floor is in. laid with mosaics of Italian marble. At the north end of the hall is a wide handsome staircase, which branches off, right and left, to the open corridors or side aisles on either hand upon the first floor. Where the stairs branch a superb marble statue of Darwin has been placed. The lofty ceiling is admirably decorated, and is very effective. Along its central line there is a double row of panels, in groups of six, following the curve of the vault. On these are representations, in relief, of many species of trees, shrubs and flowering plants. Each tree decorating the central part of the ceiling occupies six panels. The height of the building makes this bold treatment absolutely necessary. But over the staircase and landing leading to the second floor the ceiling is less distant from the eye; therefore a tree is represented in each panel, and many fine details have been carefully worked out, details that were purposely omitted in the central part, as they would have been lost in the distance. One unpleasing effect of the loftiness of the arched roof is that it dwarfs the cases placed around the room.

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THE KLAMATH NATION.[1]

II.—LINGUISTICS.

WHEN, early in the present century, the American languages, or rather a certain number of them, and particularly those of the Algonkian, Iroquoian, Mexican, Peruvian, and Araucanian families, became the subjects of scientific study, the first emotions which this study excited were those of surprise and pleasure. The elaborate forms, the many ingenious methods of word-composition, and the singular capacity for expression thence derived, filled the first inquirers with admiration. This admiration, expressed with the enthusiasm of discoverers, naturally awakened scepticism and adverse criticism. The criticism, originating mainly in prejudice and the pride of race, and based on that partial knowledge which is sometimes more misleading than ignorance, was for the most part unfounded and unjust. The critics objected that the American languages, being those of barbarous tribes, must necessarily be inferior to the idioms of highly civilized races, like the Aryan and Semitic nations; but they forgot that the early Aryans and Semites were themselves barbarians, and yet their languages, as we know from many facts, were as well constructed and as expressive in their era of barbarism as in that of their highest culture. The objectors also informed us that the reason why the words of the American languages were of such elaborate formation and often excessive length, was simply because the speakers, being barbarians, had not attained the analyzing power required to reduce the vocables to their component parts; but further investigations have shown that many American languages, including the Dakota, the Maya, and the Othomi tongues, are in some respects even more analytic than the Aryan, and their words generally briefer. We were further told that the American idioms had not the substantive verb, which, we were assured, was the highest expression of Aryan and Semitic analysis and abstraction. But later researches have found this verb in the Athapascan, the Sahaptin, the Klamath, and various other Indian tongues, as fully developed as in the Sanscrit or the Greek. Then we were assured that American languages had few or no expressions for abstract ideas. We now find that some of them abound in such expressions, and have peculiar forms especially designed to indicate them. The objectors derided certain Indian languages, like the Iroquoian and the Algonkian, in which the terms of kindred must always have a possessive pronoun attached to them. How poor, they argued, must be the speech of a people who cannot say simply "father" and "son," but must always employ the composite forms, "my father," "his son," and the like. We now know that languages of this type are not universal, and that in idioms spoken by tribes lower in culture than the Algonkians and the Iroquois, the possessive pronouns are independent words, and are never attached to the nouns. Finally, these critics, all of Aryan or Semitic origin, proudly assure us that the noble races to which they belong are the only peoples whose languages are really inflected. All other idioms belong to a lower type, the "agglutinative." Their so-called inflections are simply bits of significant words, affixed to the roots, and still retaining indications of their origin. Duponceau, the first and greatest of American philologists, has long ago shown, by the evidence of the Delaware grammar, the error of this assumption; and we now have to see how completely this and most of the other objections of the worshippers of the Aryo-Semitic fetish are disproved by the results of Mr. Gatschet's careful and thorough studies.

Pure inflection, properly speaking, — that is, inflection of non-agglutinative origin, — is a change made in the substantial or radical part of a word to indicate a difference of meaning, as when the Hebrew changes the ground form of *lamar*, to learn (or "he learned"), to *lemor*, to express the imperative mood, or as when the Ojibway, to form the participle, changes *nimi*, he dances, to *namid*, dancing. In the primitive Aryan languages the most important change of this description is the reduplicative form, which in the Sanscrit, Greek, and Gothic, and occasionally in the Latin and other tongues, is used to give a preterite signification. This form of inflection occurs, with varying purport, in many American and Oceanic languages. Most generally it indicates plurality, as in the Mexican and Sahaptin idioms; but frequently it expresses (as in the Japanese and the Dakota) iteration, distribution, or other allied meanings. In the Klamath it assumes a wide development, pervading the whole language, and modifying almost all the parts of speech, from nouns and verbs even to many of the particles. Its principal functions, according to Mr. Gatschet, are iterative and distributive. But the various modifications of meaning produced by redoubling the first syllable or the first two syllables of a word, with many euphonic changes, give nice distinctions, which enrich the language to a remarkable extent. Thus from *lama*, to be dizzy, we have *lemlēma*, to reel or stagger; from *palah* or *pelah*, quickly, *pelpēla*, to work, to busy oneself at; from *tuēka*, to pierce, *tuektuéka*, to stare at, i.e., to pierce with the eyes; from *wita*, to blow (as the wind), *witwita*, to shake or struggle; from *mukash*, fine feathers or down of birds, *mukmukli*, downy, soft. The verb *lutatka*, to interpret, makes its frequentative mood by an abridged reduplication, *lultatka*, to interpret frequently, and hence we have the noun *lultatkuish*, a professional interpreter. So from *shiukish*, one who fights, a derivative of the verb *shiuka*, to fight, we have, by a twofold reduplication, *shishókish*, a warrior, and *shish'shokish*, a hero, one who has fought in many battles; and, in like manner, from *tamnuish*, one who is travelling (a derivative from *támenu*, to travel), we have *tatamnuish*, one who travels habitually, a stroller

[1] The first article — on the "Klamath Country and People" — appeared in the last number of Science. The third and concluding article — on "Klamath Mythology and General Ethnology" — will appear in the next issue.

or tramp; from *latcha*, to build, we have, in the frequentative or usitative form, *laltshish*, an architect; from *tedsha*, to wash, *tetádshish*, laundress. Almost endless examples might be given, showing the wealth of varied expressions which the language derives from this form of inflection.

Of the more ordinary class of inflections, derivational and grammatical, produced, like most of those in the Aryan tongues, by the agglutinative process, the Klamath has a vast number. Mr. Gatschet gives a list of formative affixes, filling more than a hundred quarto pages, and rivalling in extent and variety the list comprised in the second volume of Brugmann's "Comparative Grammar of the Indo Germanic Languages." The prefixes exceed fifty, and the suffixes two hundred. These affixes have sometimes internal euphonic inflections. The prefix *hash*, or *hesh*, for example, which forms causative, reciprocal, and reflective verbs, varies its vowel in a certain correspondence or euphonic correlation (though not always agreement) with the varying vowel of its radical. From *pan*, to eat, we have *háshpa*, to feed or cause to eat; from *uámpeli*, to recover, *heshuámpeli*, to restore to health; from *púnua*, to drink, *hushpanua*, to give to drink. *A* is a common suffix, which forms verbs from nouns, adjectives, and particles; *ka* is a "factitive" suffix, forming causative and transitive verbs; *ank* is the suffix which forms the present participle, like the Latin *ans* and *ens*, and the English *ing*. An example will show the fine shades of meaning in the derivatives formed by these suffixes. *Hewa* or *shewa*, to suppose, believe, think, coalesces with the reflexive prefix *hush* to form a new verb *husha*, to remember. The factitive affix *ka*, added to *husha*, produces *hushka*, to think about a thing, to study. The active participle of *hushka* is *hushkank*, thinking, studying. Adding to this the verb-forming particle *a*, we obtain the derivative verb *hushkanka*, to be reflecting or considering, to be in a certain mood or state of mind about anything. These word-forming particles yield an enormous addition to the Klamath vocabulary.

The declensions of nouns and adjectives resemble those of the Aryan languages, but are more extensive and more logically exact. There are fourteen cases, comprising, besides those of the Sanscrit, Greek, and Latin, several locative cases, and a temporal case. The latter ends in *emi* or *ăm*, and signifies "during" or "at the time of;" as from *skō*, spring, we have *skoémi*, during springtime; from *kish*, sunset, *kishémi* or (contracted) *kissăm*, at sunset. The accusative (or objective) case of "inanimate" nouns — corresponding to the Latin neuter — has (as in Latin) the same form as the nominative; but that of animate nouns ends in *ash*, or sometimes simply in *sh* or *a*. Thus *laki*, chief or head-man, has in the accusative *lakiash; muni*, great, has *muyánash*. The adjective agrees with its noun in case and number, though with some variations in the forms; thus from *muni laki*, great chief, we have in the genitive (or possessive) case *muyánam lakiam*, of the great chief; in the accusative, *muyánash* (or *munish*) *lakiash;* in the instrumental case, *muyántka lákitka*, by means of the great chief; in the directive case, *muyán'sh* (or *munish*) *lakiashtala*, toward the great chief, etc. The distributive form, which answers for the plural, has, in the nominative, *múmeni laláki*, each great chief; in the accusative, *mumián'sh* (or *múmenish*) *laláki-ash;* in the possessive, *mumiánam laláki-am*, of each great chief; and so on, through the various cases.

Space fails for describing the conjugations of the verb, except to mention the two participles, so curiously resembling the Aryan forms, namely, the present (or indefinite), ending usually in *ank* or *an*, and the preterite, ending in *tko* or *tk*; as from *koka*, to bite, *kokank* or *kokan*, biting, and *kokatko*, bitten. The substantive verb *gi* or *ki* (pronounced *ghee* or *kee*) has for its present participle *gian or giank*, being, and for its preterite *giṭko*, been. As an auxiliary verb it is used, in its various inflections, with the past participle of other verbs to form the passive voice, as in *kokátko gi*, to be bitten; *kokátko giuapk*, will be bitten; *kokátko gît*, may be bitten; *kokátko giuga*, in order to be bitten. This substantive verb has a signification as abstract as the same verb in any Aryan or Semitic language, with often a wider compass of meaning, answering to both *ser* and *estar* in Spanish.

The pronouns, personal and possessive, are never combined with either the noun or the verb. What some grammarians have styled the transitions, and others the composite or objective conjugations, are therefore unknown to the Klamath, which in this respect is as analytic as the English or German, and far more analytic than either Greek or Hebrew.

Mr. Gatschet, after describing the great variety of structure in the American languages, varying from the extremely synthetic to the markedly analytic, observes that the Klamath "occupies a middle position" between these extremes, "but that, nevertheless, it shows very plainly all the characteristics of agglutinative tongues." He should have added — as his own minute and careful descriptions clearly show — "but not more plainly than these characteristics are displayed by the Sanscrit or the Greek." Liberal and philosophical as he is, he has not yet succeeded in entirely emancipating his mind from the influences of the Aryo-Semitic superstition, which is now in comparative philology what the geocentric superstition, before the time of Copernicus, was in astronomy. But he proceeds, in terms as accurate as they are elegant and forcible: "These and other characteristics impart to the language of the Maklaks a well-defined type, and approach it to the tongues of modern Europe, in which analysis has not preponderated over synthesis. An attentive study of the numerous texts obtained from the Indians [of which, it should be added, Mr. Gatschet's work furnishes an ample and most interesting collection] paired with constant comparison of Klamath structure with the structure of many foreign and American languages, could alone furnish a solid basis for establishing the grammatical rules of this upland tongue. The rhythmic, stately, and energetic tenor of its periods, especially those of the larger mythologic pieces, will please every student who has ever lent his attentive ear to the well-poised periods of Roman historians, and will even evoke comparison with them, not as to their contents, but as to the plan of the well-constructed sentences which appear in these narratives."

HORATIO HALE.

Clinton, Ontario, Canada.

IOWA ACADEMY OF SCIENCES.

As announced, the sixth annual session of the Iowa Academy of Sciences was held in DesMoines, on the 29th and 30th of December. Interest and enthusiasm were manifested throughout the session. Heretofore the annual meetings have been held in September, an unfortunate time for most of the scientific workers of the State. The following programme was carried out.

Professor C. C. Nutting, the president, delivered an address on "Systematic Zoology in Colleges." He urged the importance of systematic zoology in colleges. He thought

it unfortunate that the German craze for morphology should occupy so much attention in colleges to the exclusion of very important systematic work. He would not, however, belittle the work of the morphologist, since the whole structure of the systematic zoologist rests largely on the results of his labors. One reason why systematic work has failed to command the attention that it deserves on the part of the college student is a wide misapprehension as to its real nature and scope. A majority of students are wont to regard systematic zoology as particularly to be shunned on account of what they consider its most essential character — an endless succession of fearful names, a veritable nightmare of polysyllabic horrors, the dead languages resurrected for the special discomfort of the unfortunate student. Systematic zoology is much more than a collection of names. Classifications are but the skeletons which his studies and investigations should clothe with living facts, so that finally the dry bones will be almost forgotten as he contemplates the beauty and symmetry of the well rounded vital structure.

Professor F. M. Witter read two papers on "Arrow Points from the Loess" and "The Gas Wells near Letts, Iowa." The hills on which the city of Muscatine stands are covered with a very fine deposit of loess, which in some places must be nearly fifty feet thick. This loess abounds in land shells, the bones of at least two American reindeer, a considerable part of the antler of the elk or common deer. The ancient loess lake is nearly 150 feet above the present high-water of the Mississippi. In this loess deposit has been found an arrow point and a spear point. In it also occur fragments of the tooth of an elephant. Professor Calvin, in discussing this paper, remarked that arrow points had been found in the loess at Council Bluffs some years ago. He also referred to a skull found in Iowa that resembled the famous Neanderthal skull. That man was undoubtedly contemporaneous with the elephant shortly after the great ice age.

In speaking of the gas wells of Letts, Iowa, which have been flowing since December, 1890, Professor Witter thought it due to the decomposition of organic matter in the lower part of the drift material. Professors Call and Calvin both remarked that the flow of gas would not be permanent; it was wholly unlike the gas of Ohio and Indiana. Chemical examination has shown that this gas is closely related to marsh gas.

Professor Haworth read papers on "Melanite from Missouri," and "Prismatic Sandstone from Madison County, Missouri" (read with consent of the state geologist). He also presented a paper on "Limonite Pseudo-morphous after Calcite."

Professor J. E. Todd read a paper on "Striation of Rocks by River Ice." Specimens were exhibited showing striæ. These were observed at St. Louis, Cape Giradeau, Mo., and Sioux Falls, So. Dakota, also at several points along the Missouri. He also presented, by title, a paper on "Further Notes on the Great Central Plains of the Mississippi."

Professor Calvin gave an account, showing specimens, of the distinctions between *Acervularia davidsonii* and *A. profunda.* The species are quite distinct, not only does this difference appear in the external characters, but when they are polished. Both species occur in Iowa, sometimes in the same geological formation.

Professor Call spoke of "The Present Status of Artesian Well Investigation in Iowa." This work has been done in connection with the Iowa State Weather and Crop Service. The artesian wells are very numerous and extensive. Many of the so-called artesian wells are not artesian wells in the sense that Professor Call uses the term. As an instance, he cited the wells at Dunlap and Council Bluffs, which are not artesian, since water does not flow under hydrostatic pressure. Professor Todd took issue with him on this point. The wells at those places are on high elevated portions of the country. If they had been bored on lower ground, a short distance away, they would produce flowing water.

Mr. Charles R. Keyes presented three geological papers as follows: "Geological Structure and Relations of the Coal Bearing Strata of Central Iowa," "Brick and Other Clays of DesMoines," and "Aluminium in Iowa." The clay used at Hampton, Iowa, where a large stock company has recently been organized, is said to be the richest in the country, yielding eight ounces per bushel, or three ounces more than is produced in any known deposit of the neighboring States. Aluminium is soon to take the place of iron to a large extent in the arts, and the value of the early development of the industry cannot be overestimated. In speaking of the brick and other clays of DesMoines, he said that perhaps no province in the Union is better supplied with raw material of unexcelled quality for the manufacture of those objects commonly made from clay than our own State.

The only chemical papers were those presented by Professor G. E. Patrick. One was on "Sugar Beets in Iowa." Something over 500 samples from more than half the counties of the State have been analyzed. The results are highly gratifying. Though the sugar content on an average is less than in Nebraska, the yield is considerably more. More sugar can be grown on an acre in Iowa than in Nebraska. It was also shown that beets on the station farm, although under the best of culture, contained less sugar than those of Muscatine, which is owing to soil conditions. Certain portions of this State are apparently well adapted to the growing of beets for sugar production, and he mentioned the fact that of the 500 samples of beets recently analyzed at the Experiment Station, sent in from all parts of the State, the best have come — and in large numbers — from the regions about Davenport and Muscatine. He added, however, that "there may be other parts of the State just as well adapted to the beet-sugar industry as the localities here named." Professor Patrick's other paper was on the subject, "Can Fat be Fed into Milk, i.e., Can the Composition of Milk be Modified by Variations in the Kind of Food?" As opposed to the writings of several other scientists who deny food influence upon the composition of milk, he cited a number of European and American experiments,— one of which was recently performed at the experiment station at Ames,— which seem to prove conclusively that the kind of food fed to cows does have a material influence upon the percentage of butter-fat in the milk.

Professor S. E. Meek presented a paper "On the Fish Fauna of Arkansas and Iowa Compared." The river basins of eastern Iowa contain many more species than the river basins of the western part of the State. About 120 species occur in the State. Arkansas, which has not been thoroughly explored, contains 150; the darters being more numerous in Arkansas than in Iowa.

Professor R E. Call exhibited a specimen of "An Abnormal Hyoid Bone in the Human Subject."

Professor H. L. Bruner, in a paper on "An Aboriginal Rock Mortar," referred to relics found on the east slope of the Franklin Mountains, about eleven miles north of El Paso, Texas, and near the mouth of the "Hous Cañon."

Professor Tilton found near Indianola, Iowa, a three-legged snow-bird, which was exhibited. In domestic animals this

is not an uncommon occurence, though it is rather rare in wild animals

Four entomological papers were read. Professor Herbert Osborn presented two, on "The Orthopterous Fauna of Iowa" and "Notes on Certain Iowa Diptera." Sixty-seven species were enumerated. The notes were based on specimens found almost entirely in the central part of the State. The Orthoptera are among the most important of the injurious insects of this State, almost all the species being destructive, and scarcely one that can be considered as of any benefit. A Texas species, *Arphia conspersa*, was reported from Ames; *Periplaneta orientalis*, apparently confined to larger cities; and *Platamodes pennsylvanica*, very common in doors and out. Professor Osborn and H. A. Gossard presented some "Notes on the Life History of Agallia sanguinolenta." This leaf-hopper, though a clover pest, also feeds on beets, rutabagas, cabbages, and blue-grass. It is active even in midwinter, on sunshiny days. The first brood of larvæ appear between early May and July 1. The earliest individuals of the brood are nearly matured by the first of July. Larvæ can be found, in all stages, from this time until the advent of winter. Most of the individuals are believed to be included in two broods.

Professor C. P. Gillette, in a paper on "How the Female of Cacœcia semiferana Protects Her Egg-Clusters," stated that one of the most novel methods is that employed by the box-elder leaf-roller. The egg patches are covered over with a gluey material, and this is nearly always completely covered with a dense mass of scales placed like shingles on a roof. These scales closely resemble those found on the under side of the abdomen.

Professor T. H. McBride gave a talk on "Slime Moulds of Iowa." These organisms are especially interesting not only because of the beauty of the structures themselves but also on account of their relationships to other living things. Are slime moulds plants or animals? The slime moulds of Iowa need investigation. Our flora (regarding them as plants) is comparatively rich in this direction. The proper reference of fruit to plasmodium is as yet little known in many species. Slime moulds exhibit periodicity in their appearance,—sometimes fail in a given locality for years, and then abundantly reappear.

Botanical papers were presented by Professor L. H. Pammel. One was on "Bacteria of Milk." A large number of cultures were exhibited. In the "Report of Committee on State Flora" several interesting species new to the State were mentioned. Muscatine seems to be especially favored with some southern plants, like *Rhexia Virginica*, *Carya olivæformis*, and *C. sulcata*. Weeds like *Solanum rostratum*, *S. carolinense*, *Cuicus arvensis*, etc., are spreading. A third paper was presented on the subject of "Phænological Notes." One of the interesting questions in connection with our flora is the relation that climate has to our wild plants, the time of leafing, flowering, and fall of leaves, as well as the effects of frost on plants. In 1886, the soft maple (*Acer saccharinum*) was in flower on Mar. 22; in 1891, Apr. 11. *Ulmus Americana*, in 1886, in flower, Apr. 12; in 1891, Apr. 18. The succession of flowers in herbaceous plants in 1886 and 1891 was: *Hepatica acutiloba*, Apr. 9 (1886), Apr. 12 (1891); *Capsella Bursa-pastoris*, Apr. 15 (1886), Apr. 24 (1891); *Mertensia Virginica*, Apr. 20 (1886), Apr. 28 (1891). Frost and its effects on some plants were noted: *Portulaca oleracea*, early in September, tips frost-bitten; Oct. 7, more or less destroyed; Oct. 9, plants black in an open field; *Panicum sanguinale*, injured seriously on Oct. 8; *Borrago officinalis*, Oct. 22, a few leaves affected; Oct. 23, many leaves killed; *Scabiosa atropurpurea*, Oct. 7, no injury; Oct. 23, no injury; Nov. 11, no injury; Nov. 21, some injury to leaves. In a paper on "Experiments in the Prevention of Corn Smut," made at the Iowa Experiment Station, it was shown that by treating seed corn with ammoniacal carbonate of copper and copper sulphate no beneficial results were obtained. In plot No. I., treated, there were 6 smutted plants against 8 in check; in plot II., 6 smutted plants against 7 in check; in plot III., 42 smutted plants against 38 in check; in plot VII., 38 smutted plants against 32 in check. These experiments should not be considered as showing conclusively that smut does not enter the delicate tissues of corn by way of the seed. Incidentally he referred to some experiments now carried on at the college farm, in which ammoniacal carbonate of copper, Bordeaux mixture, and other substances were mixed with soil, in which, afterward, corn was planted. Ammoniacal carbonate of copper in the soil retards the germination of corn.

The following papers also appeared on the programme: Miss Minnie Howe, "Some Experiments for the Purpose of Determining the Active Principles of Bread Making;" Dr. N. B. Niles, "The Action of Disinfectants on Nutrient Media;" Professor J. S. Tilton, "Erosion by Middle River for November, 1891."

A committee of five was appointed to ask the legislature to print the Proceedings in connection with the Annual Report of the Iowa Weather and Crop Service. Mr. J. R. Sage, Professors Nutting, Haworth, Davis, and Pammel constitute the committee. The officers of the Academy for 1892 are: C. C. Nutting, president, Iowa City; L. H. Pammel, first vice-president, Ames; E. Haworth, second vice-president, Oskaloosa; Herbert Osborn, secretary and treasurer, Ames; executive council, the officers and J. E. Todd, Tabor; F. M. Nitter, Muscatine; and R. E. Call, DesMoines.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Traumatic Hypnotism.

HYPNOSIS is a psychical state in which an individual is more than usually susceptible to suggestions. As is well known, the degrees of suggestibility are many. Making the distinction between physiological and pathological hypnotism, the traumatic hypnotism would, of course, fall under the latter head. We have been led to employ the term "traumatic," from an investigation of the following case. The case is all the more interesting, since the patient is a physician.

Patient says: "I was in a village cart coming up the street; the horse was spirited; a man tried to stop him from running away. The last thing I remember is calling to him to get out of the way. The following (of which I was unconscious) has been told me by others: the cart struck another wagon and threw me into the air, and I came down in a heap, as if one were going to dive into the water, striking on my back and side, having the lines wound around my hands. I was pulled forward and up by the horse starting, and dragged about twenty feet, when the lines slipped off of my hands. I did not say anything at this moment; they picked me up for dead and carried me into a drug store. I then began to talk with them, looking deathly pale. They asked me if I was hurt, I answered, 'No, not at all, I am all right.' I would moan every now and then during the conversation. Quite a number of my friends came in, and I called one by name. Then I took off my bonnet and walked back where I could wash my

face and hands; I moaned all the time I was doing this; they all thought I knew what I was doing. I walked out towards the hack, but told them I preferred to wait till the crowd got out of the way. On the way home my daughter got into the hack, and I told her not to worry, that I was all right. I walked from the hack into the house. The doctor asked me to sit down, but I said I did not dare to, for I should lose control of myself. I asked to have a pin taken out of my dress. They gave me some whiskey. Then I suggested if it would not be a good idea to take a hot bath. My daughter asked me where the arnica was, and I told her in the office on second shelf, which was correct. Then they gave me the hot bath, and while the servant was pouring some water on my head I came to myself for the first time since calling to the man to get out of the way, but only for a few seconds, hearing only voices and feeling something strike my head, giving pain. I was then taken out of the bath and put into bed; I told them how to unfold the bed; then the doctor put a saturated cloth on the wounded part of my head; I told them to get towels and put them on the pillow to prevent soiling it. Then I began to be very delirious [patient now passes from hypnotic into a delirious state], and talked incessantly about a railroad accident; my husband is constantly on the road and I have worried sometimes about it. I repeated the same things over, saying the railroad switch was wrong, etc. This delirium lasted about an hour. The surgeon arrived, and on putting his finger between the scalp and skull I felt a flash of lightning and saw it. I said 'I cannot stand this pain,' and then I became conscious for the first time of the injury on the back of my head. I was in agony, I could feel distinctly a grating when his finger was put under the scalp, and on pressure in one spot there was a bubbling sensation, that seemed to shoot right over the brain. During this time I was conscious, but did not see anything. It is three weeks since the accident occurred, and I have had headache continually, being a re-echo of the old pain. When I try to read, the right eye sees double; my head feels double; the wounded side feels thick; I have had very unpleasant dreams since."

According to the description of the surgeon, the wound was on the right parietal protuberance over the third descending convolution; it was a contusion.

Inquiries of those who saw the accident and subsequent events confirm the statement of the patient. When picked up her eyes were closed; then water was poured on her head, and she opened her eyes; she could not quite remember her husband's name; then she said she felt better and went and washed her face, etc., as already described.

It is interesting to note the states of consciousness: first, unconsciousness at time of accident; then, water being poured on her head, patient passes into the hypnotic state; this lasts nearly an hour, during which she so conducts herself that her friends do not suspect but that she is herself. During this hypnotic state suggestibility may be said to have been normal, since she responded to every one naturally. Her normal self seemed to control her hypnotic self fully; this latter self was the only one during the hour which was conscious.

ARTHUR MACDONALD.

Georgetown Medical School, Washington, D.C.

Cold Waves.

IN the December number of the *American Meteorological Journal* Dr. A. Woeikof has presented a paper on cold waves, in which he attacks with some force views which have been expressed by Professor Russel. The belief that a cold wave is due to the passage of a mass of cold air, which has a vertical diminution in temperature of 1° in 180 feet, at twenty or more miles per hour, over the earth's surface heated sometimes 30° or 40° above the air in contact with it, for a distance of 2,000 miles, without accretion or reinforcement, is certainly unique. It is certain that Dr. Woeikof will not recognize this as his view. He will say that the cold will be added to by radiation from the sod or soil, all the more intense because of the clear, dry air of the cold wave. When we think, however, that, as the cold wave advances at great velocity, the earth's surface is frequently 40° warmer than the air immediately in contact with it, it is difficult to see how the earth's surface can do aught except warm up the air. It seems an inevitable conclusion that a mass of cold air, passing in any direction over the earth, which is itself heated many degrees above the air, must inevitably lose its characteristics in a very short time.

If Dr. Woeikof could study only a very few of our cold waves he would very quickly change his belief. He is at a great disadvantage in that he resides in a country where they have no cold waves, properly speaking. It is well known that in Europe the high areas remain nearly stationary for weeks at a time, and as a result a very abnormal condition of temperature supervenes. The sun shining upon stagnant air heats it up, and this effect becomes cumulative, a little more heat being added each day; besides this, the earth's surface, in this stagnant air, cools down by radiation, as a consequence it frequently happens that the earth's surface is cooler than the air at 10,000 feet; and this has given rise to the most extraordinary theory and one that directly contradicts all known orthodox hypotheses, namely, that in our high areas the air is abnormally heated, while in our storms it is abnormally cooled. It is evident that no discussion of cold waves can be intelligently carried on under such conditions. Dr. Woeikof also suggests that observations at Pike's Peak might be of assistance in studying these phenomena, but this cannot be done at that point for this reason. Pike's Peak is situated on the edge of a plateau about 4,000 feet above sea-level and abnormally heated; also, on the east, there is a marked falling off of the plateau. In consequence, the summit sometimes has the temperature of the plateau and sometimes that of the eastern plain. No cold waves pass over the summit, for the reason that the mountains form a barrier. Most of the cold waves pass down from Manitoba or Assiniboia far to the east or north-east of the mountain.

It would appear that one or two considerations which have an important bearing on this question have been overlooked. For example, it is not proper to think of a cold wave as a mass of cold air having a uniform velocity throughout its height. It is well known that, owing to friction with the earth's surface and other obstructions, the velocity of the air at the earth is much less than at 6,000 feet. It is probable that on Mt. Washington, during the passage of a cold wave, the velocity of the wind is double that at the base. We may consider that the velocity increases uniformly up to this height, or at 3,000 feet it would be about midway between that at the earth and that at the summit. The consequence of this is readily seen. A point in a layer of air at the earth, moving 20 miles an hour, in 10 hours would be 200 miles from its starting-place, but at 6,000 feet a point in the layer would be 400 miles from its first position. If we suppose the temperature diminution in height is 1° in 180 feet at the beginning, and the horizontal temperature difference at the same time is 40° in 200 miles, then, at the end of 10 hours, the vertical diminution in height would become about 1° in 90 feet. The temperature distribution in the latter case would cause a serious disturbance in the equilibrium, according to orthodox views, and there would be an upsetting of the layers, and, in consequence, the cold of the upper layers would ultimately reach the earth. Of course in nature there are no such violent changes, except rarely in summer time, but such an interchange must take place by degrees.

The observations at Mt. Washington abundantly bear out this view. These have been recently published by the Weather Bureau in curves for January, February, and March ("Monthly Weather Review," July to Oct., 1891). On examining the curves we find that in front of a cold wave the diminution of temperature with height is much increased, frequently to more than double the normal, while after the cold wave the temperature is frequently *lower* at the base than at the summit. In other words, the cold wave reaches the summit 5 to 8 hours before it does the base, and the warming up also lags behind, at the base, the same length of time. A neglect of this consideration lies at the bottom of many of Dr. Hann's vagaries regarding temperature distribution in cyclones and anticyclones. Now, if a cold wave is composed of layers of air moving at different velocities as we recede from the earth, it is easy to see that the velocity of the air at the earth need not be that of the cold wave, for the upper layers of

air would flow over the lower, bearing along the cold wave, and this cold air would gradually work its way down to the earth.

Until we can obtain observations in free air we must be content with hypotheses and careful study of mountain observations. While no present hypothesis will prove satisfactory in all its details, owing to our ignorance of upper air conditions, yet we can rest assured that the view at the opening of this discussion can by no possibility be correct. E. N.

BOOK-REVIEWS.

The Philosophical Review, Vol. I., No. 1. Edited by J. G. SCHURMAN. January, 1892. Boston, Ginn & Co.

THE establishment in this country of a review devoted to pure philosophy is a noteworthy event, and may prove an event of real importance. The *Review*, we are informed, is to receive "support from private endowments, so that its financial basis is sound and durable;" and though the source of this support is not mentioned, it may be inferred from the fact that the copyright is held by the treasurer of Cornell University, the editor being professor of philosophy in the same institution. The mechanical appearance of the *Review* is similar to that of the *Political Science Quarterly*, the present number containing a hundred and twenty-eight pages. It will be published bi-monthly at seventy-five cents a number or three dollars a year. The editor contributes a prefatory note, in which he announces the character and scope of the *Review* and the attitude it proposes to take. "It will aim at the organization, the diffusion and the increase of philosophical knowledge and activity in America," and "will be an organ through which investigators may make known to their fellow-laborers the results of their researches and reflections." The editor takes a roseate view of the prospects of philosophy in America, but the reasons he assigns therefor, except the freedom of American life and thought, do not seem very cogent. It is true that there is now a certain movement of philosophic thought in the country; but it seems to us to be shallow, and no philosopher has yet appeared among us capable of original thought. The *Review*, we are told, "will not be the organ of any institution, or of any sect, or of any interest," but will maintain "impartiality and catholicity of tone and spirit." This is a good rule if well followed; but observation has convinced us that an editor's predilections seldom fail to show themselves in his selection of material. Professor Schurman's views of what is needed in philosophy at the present time seem to us in one respect mistaken. He holds that philosophers ought to devote themselves to the cultivation of special departments, such as logic, psychology, the philosophy of education, etc.; whereas to our mind the crying need of philosophy just now is the relaying of the foundations, and until this is accomplished we see little prospect of fruitful work in any special department.

The leading articles in this issue of the *Review* are three in number, of which the most important is that of Professor Ladd on "Psychology as So-called Natural Science." It is really a critique of Professor James's theory of the nature of psychology and the method of studying it; and the writer has little difficulty in showing that the theory is untenable, and furthermore that Professor James himself is unable to adhere to it with any consistency. Professor John Watson criticises Kant's philosophy from the standpoint of Hegelism, and though his article contains nothing new, it is interesting as renewed evidence that Kant's disciples have become dissatisfied with the outcome of his teaching. Mr. B. I. Gilman contributes the first instalment of a paper "On Some Psychological Aspects of the Chinese Musical System," which shows much curious study, but which seems out of place in a philosophical magazine. Of the book-reviews, which are quite numerous, the ablest is that of Herbert Spencer's "Justice," by the editor of the *Review*, in which he takes essentially the same view of Spencer's doctrines that was taken in these columns when the book was first published. The other reviews are of varying degrees of excellence, some very good and others rather inferior. We must add, too, that some of the books reviewed are not worthy of any notice at all. The concluding portion of the *Review* consists of abstracts of articles in various philosophical magazines — a new feature, we believe, in a periodical of this sort, and one likely to be useful. On the whole, the *Philosophical Review* promises fairly well, and we hope it will prove worthy of its mission.

AMONG THE PUBLISHERS.

THE January number of the *Review of Reviews* contains, as its most conspicuous feature, a sketch of the Czar and the Russia of to-day, written particularly for the American edition of the *Review*, by Mr. W. T. Stead, the English editor. The article contains a number of portraits, and — what will be particularly interesting — a map showing the famine districts, and another showing the so-called "Jewish Pale," the district within which the Jews are permitted to live.

— Macmillan & Co. have in press a translation of Kant's "Kritik der Urtheilskraft," by the Rev. J. H. Bernard, fellow and lecturer of Trinity College, Dublin, and joint author with Professor Mahaffy of "Kant's Critical Philosophy for English Readers."

— Ticknor & Co., Boston, announce "The Norman Monuments of Palermo and Environs," by Arne Delhi and G. H. Chamberlin, architects, in four parts, with fifty measured drawings, several cuts in the text, and many photographic views. The edition will be limited and sold by subscription.

— Readers of Carlyle have often inquired whether it was possible to obtain some accurate text of the course of lectures on literature which he delivered in 1838. They will, therefore, be glad to hear that these lectures are now about to be published by Ellis & Elvey of London. The text now to be issued is derived from the report taken at the time by the late T. C. Anstey, two separate transcripts of which have been in the hands of the publishers.

— An account of that mysterious malady, the grip, by Dr. Cyrus Edson, the chief inspector of the New York Health Department, is published in the January number of *Babyhood*. Dr. Edson traces the history of the grip from ancient times to the present day, describes the symptoms and the mode of treatment, and furnishes valuable aids in the direction of prevention. "Crying and its Significance," by Dr. John Dorning, and "Fat and Thin Children," by Dr. W. L. Carr, are articles that will prove interesting to the readers of that monthly nursery guide. Among the numerous other contributions may be mentioned: "Keeping the Baby Warm," "Children's Lies," "Experiences in Feeding," and a full supply of "Nursery Problems."

— The January number of the *Annals of the American Academy of Political and Social Science* contains two papers on municipal government. They are the article on "The Study of Municipal Government," by Frank P. Prichard, and the article on "The Political Organization of a Modern Municipality," by Wm. Draper Lewis. This number also contains a copy of the by-laws of the Philadelphia Municipal League, an organization whose purpose is the divorce of municipal from national politics. Among the other leading articles in this number are "The Basis of the Demand for the Public Regulation of Industries," by W. D. Dabney, "International Arbitration," by Eleanor L. Lord, a strong plea for arbitration as a means of settling international disputes, in place of war. "Jurisprudence in American Universities," by Professor E. W. Huffcutt, a paper of interest to all law students; and "Instruction in French Universities," by Leo S. Rowe. Mr. Rowe has been a student in Paris for the past year, and his paper explains very fully the courses and method of instruction in the colleges of France. A new department has been added to the *Annals*. It is entitled "Discussion," and contains papers written in answer to articles which have appeared in the *Annals*. This number also contains the proceedings of the tenth scientific session of the academy, which was held in Philadelphia in November. In the Department of Personal Notes in the January *Annals*, there are brief biographical sketches of the following workers in the field of political and social science: W. C. Ford of Columbia College; A. C. Miller of Cornell; D. E Spencer of Harvard; George E.

Howard of Leland Stanford, Jr., University; H. V. Ames of the University of Michigan; W. H. Mace of Syracuse University; Ernest Mischler of Prague; R. H. Inglis Palgrave of London; the late Alfred Jourdan of Aix; Paul Heilborn of Berlin; A. Brückner and George Staehr of Kasan.

— A Spanish edition of the Story of the Nations series is being issued in Madrid under arrangements with the Putnams. Gilman's "Story of the Saracens" in this series is now being printed in raised letters for the use of the blind. The next volumes to be issued in the series are Freeman's "Story of Sicily," Oman's "Story of the Byzantine Empire," and Miss Duff's "Story of the Tuscan Republics."

— With the number for January, 1892, the *Educational Review* opens its third volume. Professor Jenks of Cornell has a paper on "Educational Values," particularly with reference to the college curriculum, and controverting the position taken by Professor Patten in an earlier number. Superintendent Marble of Worcester, Mass., makes some practical suggestions concerning the teaching of the effective use of English. Professor Richards of Yale contrasts the old and the new methods of teaching geometry; and Principal Grant of Queen's College, Kingston, Ontario, replies to Bishop Spalding's earlier argument for religious instruction in State schools. Important articles appear also on school savings banks in England, and the effect of manual training upon health. The discussion on city school supervision is continued by Superintendent Tarbell of Providence, and that on practice teaching by President W. J. Hilne of Albany. Other discussions are by the editor in-chief and Principal Owen of Saco, Me. Book reviews are contributed by Professors McLaughlin and Cameron of Yale, Oren Root of Hamilton, Gill of the Smithsonian Institution, and others.

— *The Electrical Engineer* will begin the new year with a series of articles on the electrical and magnetic discoveries of Professor Joseph Henry — the Faraday of America — by his daughter, Miss Mary A. Henry of Washington, with notes by Mr. Franklin Leonard Pope. Additional and pathetic interest is given this series by the fact that it is practically a vindication by filial hands of Henry's claims to the discovery of magneto-electricity, at a time when his work has been suffered to fall into neglect and oblivion. At the recent Electrical Congress at Frankfort, Germany, the proposition of the American delegates to name after Henry an important new unit applying to facts that he was the first to observe and investigate, failed of assent, and was postponed until the Chicago Electrical Congress of 1893, many of the European delegates saying they had never heard of Henry.

— We may regard it as certain that an apparent connection between infectious diseases and atmospheric conditions had suggested itself to the medical mind long before Sydenham attributed

CALENDAR OF SOCIETIES.

Philosophical Society, Washington.

Jan. 2.—F. H. Newell, Fluctuations of Discharge of Western Rivers; J. R. Eastman, The Mexican Meteorites.

Society of Natural History, Boston.

Jan. 6.—Percival Lowell, Shinto Occultism from a Scientific Standpoint; E. S. Morse, On the Form of the Ancient Bow in Various Parts of the World.

Wants.

Any person seeking a position for which he is qualified by his scientific attainments, or any person seeking some one to fill a position of this character, be it that of a teacher of science, chemist, draughtsman, or what not, may have the 'Want' inserted under this head FREE OF COST, *if he satisfies the publisher of the suitable character of his application. Any person seeking information on any scientific question, the address of any scientific man, or who can in any way use this column for a purpose consonant with the nature of the paper, is cordially invited to do so.*

WANTED. – *Science*, No. 178, July 2, 1886, also Index and Title-page to Vol. VII. Address N. D. C. Hodges, 874 Broadway, New York.

A YOUNG MAN (31) would like a position in a college, laboratory, or observatory, is also willing to assist at a steam engine, etc. Address J. W., care of *Science*, 874 Broadway, New York.

WANTED.—A position in the philosophical or pedagogical department of a college or university by a young man (30) who has had five years' practical experience in teaching, and who has done four years' post-graduate work in philosophy, devoting his attention during the last two years especially to study and original investigation in scientific psychology and its applications in education. Address E. A., care *Science*, 874 Broadway, N. Y. City.

WANTED.– A suitable position in Washington, D. C., not connected with the Government, and with a salary not to exceed $650 a year, by an experienced biologist with six years' university training. Applicant has been a skilful surgeon for fourteen years; is a practical photographer, cartographer, and accustomed to the use of the typewriter. He is also capable of making the most finished drawings, of any description, for all manner of illustrative purposes in science; trained in museum methods and work; also field operations and taxidermy in its various departments, and modeling, production of casts, restorations of paleontological specimens and similar employments. Address U. S. R., care *Science*, 47 Lafayette Place, N. Y.

WANTED.– By a young man (27), B.A. and Ph.D., with three years' experience as assistant in chemistry, position as instructor in chemistry or in natural sciences in college or academy, or other advantageous position as chemist. Give particulars as to work, salary, etc. F. W. MAR, L. Box 23, West Haven, Conn.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

Wanted to buy or exchange a copy of Holbrook's North American Herpetology, by John Edwards. 5 vols. Philadelphia, 1842. G. BAUR, Clark University, Worcester, Mass.

For sale or exchange, LeConte, "Geology;" Quain, "Anatomy," 2 vols; Foster, "Physiology," Eng. edition; Shepard, Appleton, Elliott, and Stern, "Chemistry;" Jordan, "Manual of Vertebrates;" "International Scientists' Directory;" Vol. I. *Journal of Morphology;* Balfour, "Embryology," 2 vols.; Leidy, "Rhizopods;" *Science*, 18 vols., unbound. C. T. McCLINTOCK, Lexington, Ky.

For sale.—A 6½ x 8½ Camera; a very fine instrument, with lens, holders and tripod, all new; it cost over $40; price, $25. Edw. L. Hayes, 6 Athens street, Cambridge, Mass.

To exchange Wright's "Ice Age in North America" and Le Conte's "Elements of Geology" (Copyright 1882) for "Darwinism," by A. R. Wallace, "Origin of Species," by Darwin, "Descent of Man," by Darwin, "Man's Place in Nature," Huxley, "Mental Evolution in Animals," by Romanes, "Pre-Adamites," by Winchell. No books wanted except latest editions, and books in good condition. C. S. Brown, Jr., Vanderbilt University, Nashville, Tenn.

For Sale or Exchange for books a complete private chemical laboratory outfit. Includes large Becker balance (200g. to 1-10mg.), platinum dishes and crucibles, agate motors, glass-blowing apparatus, etc. For sale in part or whole. Also complete file of *Silliman's Journal*, 1862-1885 (62-71 bound); Smithsonian Reports, 1854-1883; U. S. Coast Survey. 1854-1869. Full particulars to enquirers. F. GARDINER, JR., Pomfret, Conn.

For exchange or sale at a sacrifice, an elaborate microscope outfit. Bullock stand; monocular objectives, one-sixth homeogeneous immersion, four-tenths, and three inch, Bausch & Lomb, also one-fourth and one inch Spencer. Four eye-pieces. Objectives are the best made. Address Mrs. Marion Smith, 41 Branch Street, Lowell, Mass.

to the atmosphere an "epidemic constitution." The influence of weather would be measured by its effect in providing an environment suitable to germ development. Thus moist weather, whether bleak or warm, would be found conducive to the spread of contagia, and so it is. This fact has often been attested by the extension of cholera, diarrhœa, and the exanthemata. A warm and dry day, on the contrary, tends to check morbid action of an infectious kind. This fact is susceptible of more than one explanation. We may, on the one hand, says *Lancet*, regard it as a consequence of the absence of that germ-fostering condition — humidity; on the other, we cannot fail to be reminded that dry warmth and sunshine give the signal for an exodus from many crowded homes, for their freer ventilation, and consequently for diminution in the intensity of contagia. The exact value of weather changes in regard to this class of diseases, however, still is and must for some time remain *sub judice*. As for the ailments more usually associated with these changes — those, for example, more commonly known as inflammatory — the connection is here much more evident, and also in all likelihood, more direct. The association of pneumonia, bronchitis, asthma, and rheumatism with bleak and wet weather is too invariable to permit of our doubting its reality apart from any suggestion of septic agency.

— Mr. Kelway, according to *Industries*, has introduced an exceedingly simple system of signalling at night. A board is provided with incandescent lamps arranged so that different sets form different letters. If the letter N is wanted, for instance, a key is pressed which lights all the lamps which go to form this letter, and so on. The machine can be worked like a typewriter. Signalling by this means corresponds with the use of the blackboard in the daytime, but is, of course, much more rapid, and at the same time more easily followed. It is, of course, incomparably more rapid than any system of flash signalling, and is easy to read.