Airy began those great improvements in the methods of calculating and publishing the astronomical observations made, which have led other observatories to take copy after him. Airy was a methodical man, a professional and a business man. He made his work conform to a scheme laid out the year before, and that plan was strictly followed. His work as an astronomer and a calculator is valuable, because it is unbroken and comparable. The astronomical instruments that have so long stood within the walls of Cambridge Observatory were made after his own plans and under his own directions.

In 1835 Professor Airy, then in his thirty-fourth year, was appointed Astronomer Royal. For forty six years he filled that position with marked ability. Under his master-mind it is needless to say that the astronomical observatory at Greenwich was completely changed. He placed the manner of reducing the observations upon a more satisfactory basis, and equipped the observatory with instruments of a higher order of precision. In the year 1850, under his guidance, a new meridian circle was erected. It has an object glass of eight inches aperture and eleven feet six inches focal length. In 1855, at his earnest solicitation, a large equatorial telescope was placed in the observatory.

Professor Airy was a man that not only combined the philosopher with the mathematician, but was one that had an inventive mind as well. This may be seen in the many forms of astronomical instruments and their accessories due to his very active brain. The value of the observations made by him during his occupancy of the position of Astronomer Royal at Greenwich, rests not only upon their accuracy and dispatch in being published, but on their continuity. This may be seen in his reduction of lunar observations from 1750 down to a late date, a most valuable series of observations.

Airy was a man in whom his government had the utmost confidence when it came to deciding questions of grave import. He was the chairman of the royal commission empowered to supervise the delicate process of contriving new standards of length and weight, the old standards having been destroyed in the burning of the House of Parliament in 1834. He was called in consultation soon afterwards in respect to removing the disturbance of the magnetic compass in iron-built ships. He thereupon contrived a mechanical combination which has been universally adopted. His researches on the density of the earth, his fixing the breadth of railways, his care in the equipment of the British expedition to observe the transit of Venus, and the reduction of the observations after having been made, — all voice the great confidence placed in him by his countrymen, and his worth as a practical astronomer.

The writings of Sir George Airy cover a great deal in the field of philosophical and mathematical thought, and are thorough in their discussion of each subject. His pen was ever busy, and one has but to turn to the volumes of the Cambridge Transactions, the Memoirs of the Royal Astronomical Society, to the *Philosophical Magazine*, and the *Athenæum*, to find its fruits. But in the volumes issued from the Greenwich Observatory we find the great life-work of Sir George Airy. They are the polished stones, the finely carved pillars that have been used in building up the astronomy of the nineteenth century. His principal works, which have become books of reference, are: "Gravitation," "Ipswich Lectures on Astronomy," "Errors in Observations," "Figure of the Earth," "Tides and Waves," "Sound," and "Magnetism."

One whose reputation as a man of such scientific attainment as Sir George Airy has deservedly received recognition, both from his own country and abroad. He has received the Lelande gold medal of the French Institute in honor of his important discoveries in astronomy. For his successful optical theories he was awarded the Copley gold medal of the Royal Society. The royal gold medal of the same society has been given him in return for his tidal investigations. Twice the gold medal of the Royal Astronomical Society has been given him — first, in return for his discovery of an inequality of long period in the movements of Venus and the earth; second, to reward him for his reduction of the planetary observations. He has been enrolled among the most honored members of the Royal Astronomical Society, of the Cambridge Philosophical Society, and of the Institute of Civil Engineers. For many years he has been among the foreign correspondents of the Institute of France, and other scientific societies on the continent. He has secured the honorary degree of D.C.L. and LL D. from each of the great universities of Great Britain — Edinburgh, Oxford, and Cambridge. In May, 1872, he was gazetted a Knight of the Bath.

When the years shall have passed into centuries, and coming astronomers are searching the records for valuable data to be used in the discussion of questions in astronomy, the observations and results determined by Sir George Biddell Airy will be found of the highest value.

GEO. A. HILL.

STRUCTURE OF THE TRACHEÆ OF INSECTS.[1]

MR. LACHLAN'S article on insects in the "Encyclopædia Britannica" reproduces Blanchard's error of a double chitinous wall for the tracheæ with a spiral thread between. Blanchard and Louis Agassiz superadded a peritracheal circulation of blood. Joly's refutation of this view, in 1850, failed to give the real cause of the error: this was not, as suggested by him, due to bad injecting; but it resulted from observing insects when moulting. At time of moulting the trachea contains the old chitinous wall, dark and enclosing air, and surrounded with exuding fluid between it and the new chitinous wall; thus the appearance of things is much as described by Blanchard, who mistook the exuded fluid for circulating blood, and also mistook a temporary state of matters for the normal state.

The view published by me in the *American Naturalist*, in 1884, that the spiral thickenings of the trachea are really crenulations, channel-like transverse folds open outwards (i.e., away from the lumen of the trachea) by a slit or fissure, was supported by indirect evidence, and needs to be enforced so as to leave no doubt. Miall and Denny, in their monograph on the cockroach, write as if they had been able to unroll the spiral like that of a vegetable trachea, without tearing the connecting membrane, and copy Chun's very inaccurate figure, which ascribes a free continuous spiral thread to the trachea of insects just as we find it in the plants.

A re-examination of the case brings out the singular result that the whole machinery can be distinctly seen by the microscope to be such as I have described it. The profile of a medium-sized trachea of any insect can be easily seen to be grooved like the edge of a screw: all the more clearly if the trachea is slightly stretched under the cover-glass. In the living insect we may observe that the resiliency of the transversely chanelled walls responds to the muscular contraction

[1] Abstract of a paper read by G. Macloskie before the American Association of Naturalists, Dec., 1891.

of the thorax and abdomen, so as to assist the tidal movement of air outwards and inwards.

I may add that one of Chun's figures (copied in the paper in *Am. Nat.*) correctly represents the spirals of *Eristalis*, giving even the external slits, highly magnified; but he misinterprets the slits, and takes them to be longitudinal ridges on what he supposes are solid threads. I have also pleasure in learning that my young friend, Professor H. T. Fernald of Pennsylvania Agricultural College, after reading my paper in 1884, stained and cut fine sections of *Passulus cornutus* and thus shows the spirals to be a set of hollow grooves enclosing some of the stained hypodermis which secretes and surrounds the tracheæ.

Princeton College, Jan. 21.

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.

A Lightning Stroke.

ON the 30th of May, 1881, a party of ladies and gentlemen went in an omnibus from Washington to the country seat of a friend (H. C. Metzerott's), distant nine miles, in Prince George's County, Md.

During the afternoon the party was seated on the spacious veranda of the dwelling, the horses and omnibus standing on the lawn immediately to the front.

Suddenly a few clouds gathered, and, before any rain fell, a severe and sudden clap of thunder startled them. At the same instant a flash or streak of lightning descended and ripped apart the south-west corner of the roof of the frame carriage house standing alone about two hundred feet distant, descended down the sheathing to midway of the west, or end, wall of the carriage house, then at right angles apparently to the centre of the wall where the clap-boarding was ripped and shattered; then struck a brass-tipped pair of shafts standing near the north-west angle, shattering the right-hand shaft about midway, where a strip of iron covered with leather was placed to serve as a stay for the breeching strap; then apparently passed down and out at the floor by the closed door of the carriage house, where it was plainly seen by all the company moving along rapidly in small coils or circles up the road leading to the veranda, to the hoofs of the horses, playing around them with great velocity, and then apparently dissipated, no one could tell where. The horses were greatly agitated, fairly trembled, but did not move; and most of the company on the porch experienced a tingling, stinging sensation, but none were stunned. The sky soon cleared. J. H.

Washington, D.C., Jan. 25.

Traumatic Hypnotism.

THE case recently stated of a lady thrown into a hypnotic condition by being thrown from a carriage, in which condition she said and did certain things of which the next day she was entirely unconscious, brings to mind a fact that occurred near this place. Two lads of fourteen and sixteen went out to feed the stock. Coming near a young, almost unbroken colt, they leaped on his back. The animal started in a wild run for the barn, and dashing in at a low door struck the two lads violently against the beam that formed the top of the door. The door being very low the blow was not on the heads but the chests of the boys, sweeping them from the colt's back to the frozen ground. The elder lad sat behind his brother, and was thrown heavily to the ground, striking the back of his head, his brother falling upon him. Both lads rose; the elder rubbed his head, looked about, went into the barn and completed his evening tasks in an orderly manner, replying to his brother when addressed. They went to the house, and the lad warmed himself by the stove, went to the table, ate a lighter supper than usual, and replied intelligently when spoken to; but his eyes were dull and had a dazed, half-conscious look. After supper he sat by the fire for some time, laughing aloud once or twice "at nothing"—than went to bed as usual. The next morning it was found that he knew nothing of any event after the instant of jumping on the colt's back, and seeing it dash off toward the barn. He had not felt the blow, nor been conscious of the fall, or of any subsequent words or acts, until he arose the next morning, but his conduct and appearance had been normal, except the causeless laughter and the dull look of the eyes. In the case of the lady flung from her carriage, she went into a druggist's, asked for water and a clothes-brush to renovate her dress, said she was not injured, needed no help, etc. Thus she said and did things suitable to the conditions of her accident. The lad, on the other hand, continued the course of action which he had begun before his fall, feeding the stock, etc. His acts during the evening were acts of habit, and such as he repeated every evening. Neither the lady nor the lad were dominated by any other mind, nor directed in their motions by any person conscious of, or responsible for, their state, but it seems that by reason of a blow given on the back of the head in each case, both the lady and the lad were in a true hypnotic state, and were subsequently entirely oblivious of all that had occurred while they were in that condition. JULIA MACNAIR WRIGHT.

Rain-Making by Faith.

SOME of the readers of *Science* doubtless may recall numerous memorable incidents of the administration of the genial, earnest, shrewd, and eccentric President Phinney of Oberlin. Apropos to recent articles on faith-healing and rain-making is a vivid recollection of such an incident.

Some forty years ago, on a cloudless Sabbath morning, the president walked briskly up the chapel, — there had been a distressing drouth, — and began the service with an extremely fervent prayer for rain. The prayer was long, and before it was finished the skies began to darken, and almost before the congregation was dismissed a copious rain began to fall. The suggestive fact in this relation is that President Phinney had been observed during the morning to give very watchful attention to the barometer. H. CHANDLER.

Buffalo, Jan. 25

Some Curious Catnip Leaves.

AS I passed by an old deserted log cabin, where the soil was poor and barren, I noticed a bunch of catnip in an angle of the pioneer zigzag fence. So close in the corner was it, that it seemed as if it had crept there for protection. But even in its apparent retreat it was conspicuous, for vegetation generally had succumbed to the frosts of early autumn. A society for the prevention of cruelty to plants ought to be organized, I thought, for here was this little stunted looking bunch of catnip, struggling for existence, when it certainly seemed physically unable to cope with the unfavorable conditions for growth surrounding it. Poor little lonely weed, I mused, is it just that you should struggle here alone against all the hardships which put even the best dowered plants to the test? and like my humane brothers who, in order to end the misery of a poor misused horse, feel compelled to take its life, I terminated its struggles by collecting it.

The catnip (*Nepeta cataria*) has a beautiful leaf, with a rather deeply crenate margin; its upper surface has a rich, soft, downy, rather velvet-like appearance, while the deep green color is a witness of its hardihood. But the leaves on this plant, which out of compassion I magnanimously collected, were very different from the normal type; the surface was nearly smooth, and the margin of many leaves was quite entire; others were crenate only near the base of the leaf, though entire toward the apex, as shown in the accompanying illustration. Why, and wherefore, this difference in the leaves? I queried. Why have they varied from the shape recognized as the typical leaf? The little leaves themselves replied: "We are the result of poor, unfavorable conditions; we had neither strength nor vitality sufficient to