borg, in the doctrine of series, gives the law and order of successive production from the first to the last of each thing. He shows that all things are connected in order from first to last, and the first proceeds according to order, through intermediates, to the last. This can be shown by illustrations throughout nature. The sun acts into all things of the solar system, but it acts through the intermediate atmospheres, and it can produce no effect directly on the lowest, all its powers are communicated by the vibratory motions of the atmospheres. Remove these intermediate means, and the sun would cease to produce any effect in the universe ; gravitation itself would cease, according to his philosophy.

Another principle brought forth by Swedenborg is the doctrine of degrees. There are two kinds of degrees, namely, degrees of altitude and degrees of latitude. The nature of degrees of latitude is shown where there is more or less of the same kind, as, for instance, the air in its ascent becomes rarer, but it is still air, possessing the same qualities. The nature of degrees of altitude may be illustrated by the difference between air and ether. In this case air is on a lower plane. Air, be it ever so rarified, never becomes ether. It is distinctly different, and thence we say there is a discrete degree between them. Now, in the ascent toward real causes, there must be an ascent through discrete degrees. As we ascend in degree we come to more sublime and powerful forces and causes. In the lowest atmosphere, by its motions, we find wind and sound, and by its pressure are produced various effects. If we ascend into the ether we come to more subtle forces and to superior powers. These could not be exerted unless the ether were a substantial medium, but yet its presence is not manifest except by its effects, so that it is even yet regarded as a theoretical entity, because it cannot be weighed, measured or investigated by the senses. Yet in and by this intangible medium we see manifested the forces of the sun in the form of heat, light and electricity.

Subtle and intangible as is the ether, Swedenborg teaches that there is a still more subtle medium, a higher degree of matter, a round still higher in the ladder of causation, an atmosphere which he calls the aura. This atmosphere, being still purer, is the seat of higher powers. The forces of the sun flow immediately into this atmosphere, and are communicated through it to the lower. It is also the medium by which magnetism and gravitation act. It also has numerous functions connected with the interior structures of the human body, and especially in the operation of the brain.

We mention these things to show in a general way an ascent in perfection by discrete degrees. Without a knowledge of these degrees no one can gain a true conception of the real causes of things, for by them we can ascend, step by step, to perceive the seat and origin of the forces of nature.

These atmospheres, however, are only media. The force itself is in the sun. All material forces are derived from this origin. The natural sun, however, derives all its powers from the spiritual sun. In the spiritual world, likewise, there are three discrete degrees of ascent in altitude and in perfection, by which an ascent is made to the spiritual sun, which is the first emanation or production from God. Briefly stated, therefore, Swedenborg's philosophy begins at the Centre, an infinite and omnipotent Divine Man, possessing infinite love, wisdom and power. By emanation from Him were produced all lower substances in the spiritual world, and all materials in the natural world. By successive mediations through atmospheres in both worlds, He communicates all the forces and powers that exists in them, and He continually operates into and sustains all things in the order in which they were created. Swedenborg, therefore, shows to us in a philosophical form the ladder of connection between God and man, which was representatively shown in Jacob's dream, when he saw "a ladder set up on the earth, and the top of it reached to heaven ; and behold the angels of God ascending and descending on it, and behold the Lord stood above it."—Genesis, xxviii:12,13.

In the three philosophical systems that we have mentioned, the first takes an arbitrary God, working in an arbitrary way, as the Creator of the universe ; the second takes a mechanical thing, working in a mechanical way, as the creator of all things ; but the third shows an intelligent Being, working through a connected series of causes and effects, from first to last, through degrees of substances as media, to produce the results in visible and invisible nature. Which is the most reasonable and worthy of belief?

Darwin's Facts Illustrating Swedenborg's Philosophy.

An exceedingly interesting illustration of Swedenborg's philosophy is afforded by the researches of Darwin into the growth of plants.

In his work on "The Power of Movement in Plants" he published the results of his characteristically careful observations on a number of plants, the sum total of which was, that every plant-organ is continually moving in a spiral. Others had ob-

served this movement before him, and had called it "revolving nutation." But he substituted the more convenient term "circumnutation."

"All the parts or organs in every plant, whilst they continue to grow, and some parts which are provided with pulvini after they have ceased to grow, are continually circumnutating. This movement commences even before the young seedling has broken through the ground."

Rootlets under ground describe this movement, as well as parts above ground. "If we look, for instance, at the great acacia tree, we may feel assured that every one of the innumerable growing shoots is constantly describing small ellipses, as in each petiole, sub-petiole and leaflet. The latter, as well as ordinary leaves, generally move up and down in nearly the same vertical plane, so that they describe very narrow ellipses. The flower-peduncles are likewise circumnutating. If we could look beneath the ground, and our eyes had the power of the microscope, we should see the tip of each rootlet endeavoring to sweep in small ellipses or circles, as far as pressure of the surrounding earth permitted. All this astonishing amount of movement has been going on, year after year, since the time when, as a seedling, the tree first emerged from the ground."

This interesting movement in plants is so closely associated with their growth that this may be said to depend upon it. The cause for the movement has been sought in vain. It is of interest to reproduce what Darwin himself says about it:

"Until recently the cause of all such bending movements was believed to be due to the increased growth of the side, which becomes for a time convex; that this side does temporarily grow more quickly than the concave side has been well established; but De Vries has lately shown that such increased growth follows a previously increased state of turgescence on the convex side. In the case of parts provided with a so-called joint, cushion or pulvinus, which consists of an aggregate of small cells that have ceased to increase in size from a very early age, we meet with similar movements; and here, as Pfeffer has shown and as we shall see in the course of this work, the increased turgescence of the cells on opposite sides is not followed by increased growth. Wiesner denies in certain cases the accuracy of De Vries' conclusion about turgescence, and maintains that the increased extensibility of the cell-walls is the more important element. That such extensibility must accompany increased turgescence, in order that the part may bend, is manifest, and this has been insisted on by several botanists; but in the case of unicellular plants it can hardly fail to be the more important element. On the whole, we may at present conclude that increased growth, first on one side and then on another, is a secondary effect, and that the increased turgescence of the cells, together with the extensibility of their walls, is the primary cause of the movement of circumnutation." . . . "Why every part of a plant whilst it is growing, and in some cases after growth has ceased, should have its cells rendered more turgescent and its cell-walls more extensile first on one side and then on another, thus inducing circumnutation, is not known."—(Darwin: The Power of Movement in Plants, pp. 2, 3, 546.)

This frank avowal on the part of Darwin is in reality an acknowledgment that the real and primary cause of circumnutation has not been discovered. Indeed, to one who has read Swedenborg's all-embracing philosophy concerning the causes and forces of life, Darwin would appear to have mistaken effect for cause. The turgescence can be considered merely in the light of a contributing cause, a means,—indeed as a first effect of the real cause, and not itself the real cause of the circumnutation.

In the angelic philosophy revealed to the New Church it is made known that the forces that fashion the forms of plants, and therefore that produce the movement of their growth, are to be found in the conatus, flow and motion of the least forms that make up the more subtle atmospheres called the ethers. This conatus, however, does not originate in the ethers themselves, but is traceable back to the spiritual forces, or atmospheres that proceed from the sun of the spiritual world. The determination of these spiritual forces and their continual operation into the natural forces or ethers, and through them into the matters of the earth, of which the plants are composed, causes the growth-movement of plants and fashions and molds their forms.—(See Apocalypse Explained, n. 1209.)

The flow of the natural forces, or ethers, is shown in Swedenborg's "Principia," in a most exhaustive treatment of the subject, to be spiral. This spiral flow of the ethers, operating into the matters of the earth, as these are being absorbed by the plant, inevitably carries them into the sweep of the spiral movement, so beautifully described in Darwin's work.

A crude picture of this plastic power of the ethers is presented in the lower forces of nature, air and water. Look, for example, at the action of the swirl of waters excavating such "pot-holes" as are frequently seen in the tracks of mountain torrents, or of glaciers, where the spiral grinding of rock on rock, by the water's force, evidences its inherent, peculiar and irresistible motion. Or, regard the twistings of splintered wood and iron left after the cyclone's visitation. These violent forces,

exerted by water and air, mirror forth the subtler forces of the ethers, that fashion the pliant, tender substance of the growing plant, and imperceptibly carry it around in their spiral currents.

Rather than assign to turgescence the rôle of cause for the bending of the tender plant substance, we should view it as the effect of the bending by the ethers, the cells accumulating on the outer side by a constant law in the economy of nature to fix the curve so drawn.

The tendency of the ethers themselves is to a perfect spiral, but this is necessarily modified by the fixed fulcra of the plant-organs, and by many particular circumstances, described in Darwin's book.

The beautiful spirals are a familiar sight in the case of climbing plants. Darwin says: "Climbing plants, whilst young, circumnutate in the ordinary manner, but as soon as the stem has grown to a certain height, which is different for different species, it elongates rapidly, and now the amplitude of the circumnutating movement is immensely increased, evidently to favour the stem catching hold of a support. The stem also circumnutates rather more equally to all sides than in the case of non-climbing plants. This is conspicuously the case with those tendrils which consist of modified leaves, as these sweep wide circles, whilst ordinary leaves usually circumnutate nearly in the same vertical plane. Flower-peduncles, when converted into tendrils, have their circumnutating movement in like manner greatly increased."—(Page 559.)

Here are instances that can easily be watched by old and young. Those who desire to make observations on other plants, where the movement is so minute as to be unnoticed, will find in Darwin's book a complete description of his very simple but effective devices for noting such movements. The book consists, for the most part, of a wealth of detailed information of his experiments in the case of a great variety of plants, and the diagrams alone are worth studying, as completely confirmatory of the doctrine of the New Church concerning the motion of the forces of nature, as ultimations of the spiritual forces above nature.

EUGENE J. E. SCHRECK.

Detroit, Mich.

The Publication of Swedenborg's Scientific Works.

THE NEW EDITION OF THE PRINCIPIA.

The Convention's Committee on the New Edition of the Principia will have substantial progress to report at the coming meeting of the Convention. The work attempted this year has been wholly preparatory in sounding the current feeling and knowledge in scientific and educational circles generally regarding the work, to learn how far the work is at present known to leading scientists and institutions of learning, and how ready a welcome they would give to a new edition—the object of the movement being not merely to print the work, but to get it actually into the hands of scholars and scientific workers everywhere. This preliminary correspondence with a view to rousing an interest in Swedenborg's scientific hypothesis as having a direct bearing on present day problems, has seemed an important step, aside from the matter of obtaining subscriptions in advance. The replies from learned institutions and individuals in this country have thus far been quite satisfactory, and those from England and Scotland are just beginning to come in. An important question for the committee to consider at its next meeting will be that of the avenue of publication and the new editorship; how far the work had better undergo modifications in translation, and be furnished with illustrative notes relating to modern science. In so important a work it is better to go slowly, and to have in mind accomplishing the widest and most important use.

FRANK SEWALL,
Washington, D. C. *Chairman Com.*

THE REPUBLICATION OF SWEDENBORG'S PRINCIPIA.

The following circular has been issued by the Committee of the Convention. This circular contains the contents of the Principia, and some opinions of scientific men given below:

That portion of Swedenborg's Opera Philosophica et Mineralia entitled Principia Rerum Naturalium, published orginally in Leipzig, in 1734, and in English translation in London, 1845, "being new attempts toward a philosophical explanation of the elementary world," a work which, besides anticipating the Nebular theory generally attributed to Kant and Laplace (see article, by M. Nyrén, in Vierteljahrschrift der Astron. Gesellshaft, 1879, p. 81), contains the treatises on magnetism and on the evolution of motions and forms, which have elicited the admiration of many eminent scholars and philosophers, being now out of print, a committee of gentlemen, having in view the republication of the work, respectfully ask for the following items of information:

I. Does your own library or that of the insti-