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IV

# THE NEW PHILOSOPHY.

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## THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL SWEDENBORG.

### CHAPTER IV.

*Smell.*

**67.** 1. The uses of smell are as follows:—1. Smell exists in order that the soul may take cognizance of what slips into the lungs, for the sake of the blood, which takes thence atmospheric elements, and is thereby turned into arterial blood. 2. In order that the brain may be exhilarated, and perchance that its spirit may take in ethereal and, as it were, celestial elements by this way. 3. In order that the cerebrum and the cerebellum may be excited by external causes into their alternate changes of animation; likewise the lungs. 4. In order that, by the excitation of sense, phlegm may be drawn off from all the organs of the head, and from the brain, and that they may thus be purified.

**68.** 2. As to the first use, namely, that smell is in order that the soul may take cognizance of what slips into the lungs, for the sake of the blood, which takes thence atmospheric elements and is thereby turned into arterial blood, see Part II. of the *Animal Kingdom*, on the Tongue, pages 12-15, n. 284. Note: These things are to be observed:—1. That the atmosphere bears in its bosom stores and crowds of effluvia. 2. Still more so does the

ether. 3. Men sensate only the atmospheric properties and abundance; brute animals sensate also the ethereal, as is evident from the power of scent in dogs, and from eagles and other [birds], which sensate things from a long distance. 4. The aliments which smell sensates, more than taste, are the purer things of the blood. 5. But because aliments and elements of both kinds [that is, of smell and of taste] contribute to the nutrition and refreshment of the blood, hence there is so great an affinity between them; each sense fully instructs the soul, as may appear in brutes. 6. The lungs sensate at the same time, wherefore animals draw the animations of their respiration deeply. 7. This is why the nerve of the fifth pair goes to the nostrils, and the intercostal nerve to the lungs; the office that the fifth pair performs in the head and towards the sensory organs, the intercostal performs towards the lungs; wherefore they concur, or the one inflows into the other, in order that they may act from agreement. 8. The sense, as for instance taste, notices from the same cause what may be useful; for the soul regards the blood as her vicar in the body. 9. That thence the blood is turned into arterial blood, see *The Nose,* Part II., 10. That the cuticles also draw in those things, see *The Cuticle.*

**69.** That sense is to the end that the brain may be exhilarated, and likewise by this way receive ethereal aliments, appears from the following considerations:—1. It appears from the sudden change of the brain and the animus, from a very strong indrawn breath. 2. From the sudden change of the animus either to gladness or to grief (*necem*). 3. From the cuticles, the office of which the nostrils more distinctly perform; for the cuticles of the nostrils are more tender, and more immediately communicate with the brains by means of the fibres and membranes. 4. From the immense abundance of arteries and veins, as also of glandules of various kinds, as in the cuticles. 5. From the immediate sanguineous or arterial way into the brain, through the foramina of the cribriform plate, and by other communications with the arteries of the brain. See Winslow on the *External Carotid,* above. 6. It appears especially from phenomena. 7. Then also from the nature of this sense in that it sensates more subtile parts than does taste, therefore it snatches up those parts

which are suitable for the purer blood or spirit. 8. From the communication with all the medullary fibre, with each meninx, especially the pia mater, with the arteries; all these fibres, namely, the medullary fibre, the pia mater and the artery, are concentrated in the cortical substance. 9. That smell is in the very pole of the whole cranium and brain, and is the beginning of the axis of the duct into the body. 10. Therefore there is a certain concentration in the inferior sense.

**70.** *Smell exists in order that it may excite the cerebrum and the cerebellum into their alternate turns* (see *Animal Kingdom,* Part II.). 1. As an external cause which corresponds to the internal. 2. This appears from sneezing. 3. From the very organism of the fibres, and from the connection of all things pertaining to it. 4. Why not in man as in beasts, see cited passage.

**71.** Smell exists in order that the mucus may be drawn off from the organs. 1. From the ear. 2. From the eye. 3. From the brain. 4. From the blood. 5. Whence it is the duct from all [the organs of the head]. 6. Wherefore it is intermediate to all, and as it were the central place, whither all the pituitæ flow together. 7. Thus it is the common emunctory of the head. 8. When a papilla is excited, a glandule is also excited; thus also the ducts, membranes and arteries, are conjoined; for the sense is the cause of the action of all these things, for it is their life; see *Animal Kingdom,* Part II.

**72.** The use of these things which the sense of smell offers in the circle; the use is for the soul, for the spirit, for the blood; and from the blood it returns into the spirit; thus all things are clarified and exalted into gladness.

**73.** 3. The *first* movement of this sensation is the reception of those things which touch; the *second,* thence arising, is sensation; the *third,* flowing forth from sensation, is affection; the *fourth,* is change of state; the *fifth,* is the effect.

**74.** The *first* movement, or reception, is of the body or of the nostrils, which admit the air fecund with effluvia. The *second,* or sensation, is of the soul herself; for she sensates the minutest divisions of touch. The *third,* or affection, is of our mind and at the same time of the soul; for the mind does not

perceive the minutest divisions, but only the affection thence redounding, and its varieties; thence it is evident how obscure our sensation is, for one affection consists of infinite things; wherefore it is evident how fallacious it is. The *fourth,* or change of state, is of the mind and at the same time of the organ or sensory; appetite indeed intercedes and a certain affection of the animus. The *fifth,* or the effect, is of the organ itself and at the same time of the whole body to which application is made, and to which use it yields; for all things in the whole body dispose themselves for receiving, and for serving the common use.

**75.** From these things it appears that there is a circle, that it first begins in the body, tends towards the soul and returns to the body, even so that where the beginning is there are the terminations; but after the finished gyre it is the office of the body, *first,* to receive, especially so of the nostrils; *second,* of the soul to feel; *third,* of our mind to be affected; *fourth,* of the animus to desire; *fifth,* of the nostrils to be changed as to suitable state; *sixth,* of the whole body to be disposed in order that an effect may be given forth; thus the first and the last, after the gyre is run through, come together.

**76.** 4. Now as to the first movement, namely, *that it is the reception of those things which touch,* these things are to be observed:—1. Those parts are especially the harder corpuscles of the mineral, vegetable and animal kingdoms,—angulate, polygonous, plane and variously spherical. 2. These parts are like those in taste, but are smaller, for where is the smallest of taste there is the largest of smell. This is observed in this, that those things that are tasted are not smelled except as to the subtile parts; we taste common salt, alkali, acid, but we do not smell them. 3. But [we smell] the more volatile saline, sulphurous, urinous particles, and the like. 4. Wherefore these things float about in the air, and, as may appear, embraced by the bullæ or vapors themselves, when they are released from these bullæ they strike the little sensories. 5. Wherefore also they are present in greater abundance, for they are in a superior sphere and degree, where there are more varieties but greater harmonies. 6. The greatest of taste, as for instance common salt, does not act

upon the organ of smell as an object of its sense, but as an object of a common sense; for the cuticle itself or the mucous membrane feels it, whence arises a corrugation, a kind of tittilation, a permutation, and many other things; for like things at the same time allure many of the little sensories, or the glandules themselves, in which there is a common sense, similar to a more subtle and more sensible cuticular touch. 7. Whence it may appear that what is the greatest of smell is not that which is the smallest of taste, but that it is of a superior degree, of like figure with acids or simple salts, which consist of compounds. 8. The smallest of taste can be said to be one spine of acid salt, wherefore these things are the smallest trigons, cubes, parallelograms, polygons and the like; whence the very basis, or the greatest of that sense, appears; whence the smallest is known. 9. Brute animals know distinctly still purer things, on account of many causes, of which below. 10. From the above we might deduce whence arises the sense of what is fragrant, noisome and the rest, even so far that those senses can be described if the science of corpuscles be worked out, without which we never arrive at a knowledge of sensation, but only of affection, which thing is not rational, but animal. 11. How infinite are the effluvia of this kind, is evident from every object of the mineral, vegetable and animal kingdoms, in that every one of these objects continually breathe forth a billow and ocean of effluvia which continually renew themselves. Derived from magnetic effluvia a similar crowd fills full every object; especially the still purer things whence are compounds.

**77.** *As to what concerns the second movement or sensation,* it has been said that it is proper to the soul, which apperceives all the parts distinctly. 1. Thence is her affection, which differs altogether from the affection of our mind. 2. For her affection is of a superior degree, and from single differences taken together truly feels whether or not a thing is suitable for the blood; on the other hand, the affection of our mind apperceives delight, but does not therefore know from affection whether a thing conduces or not; poisonous things frequently smell sweetly, some useful things horribly, and so forth. 3. That sensation requires papillæ adequate to the objects of that sense;

wherefore those papillæ are more subtile, and are not visible except when boiled in water (see Winslow); there is also, according to Heister, a villosity. 4. Those papillæ are more tender, more marked, as may be seen under the sheath of pia mater, like the papillæ under the sheath of the outmost or coarser membrane of the tongue. 5. They arise from the nerves, even so that they are nerve forms. 6. The membranes themselves cannot give any such sense, except only the sense of touch, but the forms are adequate to the objects, which forms can apply those objects to themselves, and impress the very mode and figure upon the nerves, whence there is a corresponding modification. 7. It is similar in regard to sight, the rays of which spring back from the hard parts as objects, whence continuously exists a modification. 8. How great is the abundance of such papillæ, see Winslow. The olfactory nerves, together with their meninx, pass over into those papillæ, and are terminated in them as in their own extremities; see the authorities.

**78.** The vehicles which convey those objects are as follows:—1. The air is the vehicle which carries them about. 2. Then also the purer air or ether. 3. In the ether they flow more actively, both because they are more minute and because they float in more volatile atmospheres, which impart to them their force of striking. 4. It may seem as if there are vapors in which the parts are embraced, which are set free in the tumefied nostrils, and thus strike [the sensories]. 5. There are also spirits which bear them, as also thin oils, and the like. 6. On account of their subtility they penetrate the mucus itself. 7. They infold and insinuate themselves into a kind of thin humor, which distills from the brain through the pores of the cribriform plate; this, like the salivas on the tongue, dissolves and insinuates those parts; for this saliva is most limpid in its first origin, but this humor being evolved makes the rest thick, whence is mucus (see Winslow). Hence also this sense rejoices in its own saliva; for that something similar exudes from the smallest arterial capillaries can also be conjectured. 8. The things which are coarser are introduced into the mucus, and there beaten, and excite touch, whence also such affections and changes of state redound as are corrugations and expansions, which continually

extend themselves according to every contact, namely, by means of or along the dura mater.

**79.** *How the sense of smell penetrates the common sensory.* 1. It takes place especially through the fibres of the olfactory nerves. 2. Wherefore those fibres tend by the mammillary processes through the pores of the cribriform plate even to those little organs. 3. Those fibres are therefore multiplied and are thin; for the thinner they are the more suitable they are for the sense; furthermore, they are almost fluid, according to the description,—all these things being arguments of exquisite sensation. 4. These fibres are annexed to all the fibres of the medulla of the brain; for they arise between the corpora striata and the thalami of the optic nerves. 5. Thence the way lies open into all the cortical substance of the brain. 6. Besides these fibres, fibres of the fifth pair also flow along which carry the sense also to the cerebellum; for in order that a change of state may exist, it is necessary that it take place from the cerebellum, which induces a change of state, not only on the organ, but also on the whole body generally; this change of state is the office of the fifth pair, as has also been observed in the sense of taste. You will see many causes below. 7. Besides there is also the pia mater which hides those papillæ under its sheath; this also conveys the sense by an opposite way towards the cortex where a meeting takes place. That the pia mater enters the single spherules of the cortex and gives them a common tunic is to be seen elsewhere. 8. How very swiftly the modification traverses those very subtle fibres, and dissipates itself into the whole expanse of the membranes, even to their utmost limits, may appear from the nature of the modification. Thus on account of this meeting, sense is terminated in its beginnings. 9. The sense is also carried by an arterial way, or by the corporeal fibres which likewise enter the cortex; which has been seen in the part on the Cuticle and will be seen in the part on the Brain. 10. Hence [the sense enters] by a triple way. 11. It is allowable to add a fourth way, by the dura mater; but by this way the sense of touch proceeds, whence permutation, etc. 12. Therefore every sensation of smell pervades the entire cortical substance of the brain. 13. And by mutations of state gives the sense, which

mutations respond to the modifications of the fibres, as does sight to harder objects. Sensation in the cortex of the brain is only change of state. 14. The fibre of the nerve of the fifth pair carries those modes also to the cerebellum, but, as may appear, by the fibres alone and [also by] their tunics, thus also into the cortex by a double way. 15. The composition of the fibres corresponds to the acumen of the senses; that the acumen of sense is greater arises solely from the composition, tenderness, and multiplication of the fibres, and from the abundance of spirits in them. All these things concur in the animations in brutes, as may appear from the description of the mammillary processes.

**80.** 5. *As to the affections, which the senses of smell and taste cause,* these things are to be held. 1. The affections of the soul are of one kind, those of the rational mind another, those of the imagination another, and those of the organ itself of another. 2. The affection of the soul will show itself as a certain love of the society or commerce of its own body, for the sake of ulterior ends, either for the sake of society, or for the sake of the heavenly kingdom, altogether according to the spiritual state of the soul which looks above itself; but the natural state looks to the side or to society. 3. The affection of the rational mind is for the sake of good or evil, especially on account of its body and mind, and its safety; thence arises an affection of a kind of goodness which is believed to be here within, whither they warn those senses. The perception of goodness is according to principles *a posteriori,* according to knowledge and other things, which are the causes of the principles. 4. The affection of the imagination or of the soul is a kind of gladness and hilarity, or a sadness arising from the sense. 5. The affection of the sense itself, whether of taste or smell, as, for instance, sweetness or fragrance, or the contrary, is of the organ itself, therefore also the pleasure. This affection does not arise from the aforesaid affections, even as might have been concluded of them, but only from the harmony and more perfect form of the parts which come into contact [with the sensory], to which like modifications in the nerves respond, and like mutations of state in the cortex of the brain;

thus there is an agreement of form. 6. To know the harmonies of those mutations is an immense labor, for they are according to the forms in every degree. 7. Wherefore those senses are not corporeal, although they are not sensated except in the brain by its mutations, and the mutations of its cortical substance. There is a harmony which can be submitted to calculation, especially in these senses where circular forms occur, but it is of vast labor, and it would not now be useful to go into those subtleties.

81. *The causes of the desires and appetites, in like manner as of the mutations of the state of the organ of these senses,* are as follows:—1. The cause is the affection itself, and its cause is the knowledge or understanding of those things which affect the sense. 2. Wherefore the cause of appetites in the soul is different from that in the mind, and so forth. 3. There is of the soul indeed a love of perfecting the blood, by those parts which approach or are attracted by the atmosphere; her affection is true, but her superior affection is truer, as also her love; because the cognition of things causing that sense is true. 4. Of the rational mind is the desire for those things which touch [the sensory]; for the mind is affected by the goodness of those things according to science which it acquires by art or experience or other cognition. 5. But of the animus or imagination is appetite, arising either from the mind and thus from what is superior to itself, which is a rational appetite, or from the quality of the sense itself, thus from the sense itself of the given organ. 6. To the sense itself appetite cannot be attributed, but change of state or a disposition for receiving that to which it is thus instigated; as, for instance, will, cupidity and action. 7. From these things it may appear that they who have appetite from taste or smell alone are animal, but not rational, wherefore neither are they truly men; on this account they are not able to abstain from those things which are hurtful. They are only clients of pleasure, both in respect to quality and in respect to quantity. 8. From these causes it may appear, who excites these senses, or, rather, what excites the changes of state themselves, namely, on the part of the soul, it is her love, or, on the part of the rational mind, it is its desire, or, on the part of the

imagination, it is its appetite, or, on the part of the body, it is its pleasure. 9. This is the reason that as many as are the heads so many are the senses; and that what pleases one displeases another, that what is pleasurable to one is unpleasurable to another, and that we sometimes desire incongruous and wonderful things, as do pregnant women, etc.

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## CONNECTION OF RESPIRATION WITH MUSCULAR CONTROL.*

BY MISS LILLIAN BEEKMAN.

V. *Organic connection between inspiration of the lungs and control of the muscles by the cortical glands or gray matter cells.*

The result of thus bringing the lungs into action at birth is, to usher in the conscious activity of the larger integrated-organism of which they are a part; to which conscious life they always afterwards act as a common physiological plane or fulcrum; by placing all that coarser tissue, chiefly muscular, which the red-blood especially feeds and keeps in tension, under control of the determining activities of [the cortical glands].[1]

The indrawn breath firmly held brings the entire body under immediate control of the determinate action or "will" of the cortical glands. A deep inspiration is thus the instinctive preliminary, the physical premise, basis and fulcrum, for many actions; and that irrespective of quality. The man who desires to regain self-control takes a deep breath, and finds it effective; the workman and athlete take a deep breath preparatory to their best endeavor, and find it effective; the murderer also may take a deep breath to brace himself to the exertion of driving the knife home to an innocent heart,—and find it effective.

An inspiratory action of the lungs, deep and firmly held, is the especial and efficient means of bringing all the bodily powers and structure under the immediate direction and control of the cortical glands.

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* This is the Fifth note supplementary to the article, "Mechanism in the Brain by which Alternating States of Sleep and Wakefulness are Produced. *The New Philosophy*, Vol. IV., No. 1.

[1] "Mechanism of Sleep," Chap. I., p. 11.

This is the way it works. When the lungs expand, or "take a breath," the cortical glands are in contraction or systole. The brushing of the outside air along the nasal and other air-passages, affecting the delicate peripheral ends of the nerves there, is the general external means of stimulating the cortical glands to contraction;[2] although the cortical glands and the lungs can also act upon each other directly, if either be sharply stimulated by something acting immediately and exclusively upon it.

By all this the inspiration or *expansion* of the lungs, and the systole or *contraction* of the cortical glands, are made simultaneous; and they also are, it appears, coincident in length of time. Now *at* and *by* the systole or contraction of the cortical glands, the animal spirit (which is as it were the *arterial* side of the purer-blood circulation) is driven from the central chambers or ventricles of the cortical glands, powerfully down along the simple fibres (the pure nervous fibres) issuing from those glands; which fibres terminate, some of them in the red-blood tides, and a very great bulk of them in the centers of the corporeal "leasts" or units (or cells) of the body.

If this contraction or systolic action of the cortical glands be strong and steadily held, these corporeal "leasts" or units of the body will necessarily *be filled with the animal spirit* or arterial-purer-blood (which is the pure, homogeneous, nervous fluid), *even to impletion.*

And wherever any tissue or cell is filled with purer blood to impletion the red blood is crowded back out of its capillaries in that tissue; and thus cannot enter it at all. "For when the animal spirit acts, the red blood yields.[3]

Thus for that moment during which such contraction powerfully and steadily lasts, the tissue thus acted upon ceases, you may say, to be vascular; and becomes an "as-it-were" nervous tissue because of this "impletion of it" by the pure nervous fluid or animal spirit. And thus for that moment that tissue must become an "other self" and "pure obedience" to every determining, directing, governing activity of the cortical glands,

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[2] *Economy Animal Kingdom.* Part I., Nos. 283-4; Part II., 39, 43.

[3] *Animal Kingdom,* No. 518 (note 1).

operating by means of their "proper own," living, fluid protoplasm, i. e.—the purer or intermediate blood. This thing is true of muscular tissue pre-eminently. During its action it has practically no red blood in it.

It is to be observed that the fact that the simple fibres also weave the very channels of the red blood itself, affords a powerful adjutor help in thus driving the red blood from the bed of its own channels. For where and when the elastic simple fibres are full and swollen with animal spirit, they are greatly expanded both in length and breadth, and thus they literally narrow the fine red-blood channels.

Thus in producing this impletion of the corporeal "leasts" and "units" or cells by the animal spirit, the "red blood" is for the moment "ruled out;" and ruled out by two means or instrumentalities,—one, by which the animal spirit or arterial-purer-blood acts directly in and into the tissue; the other, that by which it also governs the red blood supply to that tissue by having a sort of contracting grip around the very red-blood vessels.

The interesting thing here is that this purer or intermediate blood which thus ousts the red blood from that very tissue[4] which is peculiarly its own kingdom, is *not* the purest, highest blood, or living, fluid protoplasm, in the body. It is, however, the particular blood which represents the state of the cortical glands,[5] and which the Writings say is kept in perfect correspondence with the marriage of love and wisdom or of evil and falsity in the man personally (or in his conscious self and will). And by this organic operation just treated of, the very interior quality of his will in its act, seems to be *by* and *in* the very act itself, structurally and dominantly inscribed, literally, on the interiors of the tissue units and structural leasts of the body, *whenever this particular blood,*—acting coincidently with

[4] Of this tissue the purer blood then takes possession even to impletion, itself alone ruling and dominating and being operatively and structurally active in the bodily leasts and units, during the time of this contraction or systolic action of the cortical glands and simultaneous deep inspiration of the lungs.

[5] *Economy Animal Kingdom*, Part II., p. 305; *Divine Love and Wisdom*, 423.

the inspiration of the lungs,—is thus driven actively and of purpose, fixedly *down into the body;* so that *it only* of the two bloods, the purer blood and the red, is there present and operative during the moment this activity lasts. Thus the very nature of the man's will inscribes itself bodily in his deed.

The inspiration of the lungs is thus a sort of "push-button," deliberately setting in motion a certain plane of effective causes or active instrumental means,—which plane of cause or instrumental means is alike common and serviceable to good, bad and indifferent ends or purposes. Its use or practical working is to bring the bodily structures immediately under the direction of the brain-cells or cortical glands; so that for the instant of its duration the body becomes (or, rather, the particular acting or muscular tissue, becomes) as it were nervous, and not vascular. And during the space of that instant the muscle is, and serves as, the *efficient instrument* of the cortical glands and their determinations. Thus the very quality of the union of love and wisdom or of evil and falsity which is in those determinations rules and is active on the ultimate bodily plane.

*Quiescence of muscular system before birth.*

Before birth,—when the systole of the heart or fountain of the red blood coincided always with the systole of the cortical glands which are the fountains and hearts of the purer blood,—determinant action by means of the muscular tissue was not possible. Because always precisely at the instant where the white or purer-blood entered its channels in the ultimate tissues with full impulse, push and pressure, the red-blood coincidently entered its channels with exactly equal impulse, push and pressure. During this finely balanced action and reaction, the tissue structure, itself being held as it were in equilibrium between two acting forces, was quiescent; and as unmoved as if neither force existed. When at birth the beating of the red-blood heart is thrown out of step and synchronism with the beating of the cortical glands (which are "the hearts" of the purer or intermediate blood circulation)—it then becomes possible for the purer blood (the *arterial* purer blood, or animal-spirit, is here meant) to "get in ahead" of the red-blood in the tissues; by running in and taking possession,—say at the time

of the heart's *diastole* or moment of absence of its contractive impulse.

To this "general ground" of possibility of getting in first, there is added the *particular* possibility of the powerful coadjutor activities of the "inspiring lungs." This coadjutorship of the lungs is based on the fact that whenever the lungs expand they communicate,—by their tendinous and membranous interconnections everywhere,—a tendency and pull and lift toward expansion to every corporeal "least" and unit of the entire mass of tissue in the body. This tendency and lift and help toward expansion by a kind of *outside pull* thus communicates a kind of diastole, or effort at diastole, to every tissue unit or cell; and this acts coincidently with and by means of the inspiration of the lungs.

Now because of this direct relation of pulmonary inspiration to the cortical glands, this outside-pull upon the bodily "units" or cells, drawing them toward expansion or diastole, must occur *simultaneously* with the crowd and pressure of the animal spirit down into the tissues by way of the "simple fibres" which terminate in them. So that the assisted tendency of the bodily "units" toward diastole or expansion always operates coincidently with the impulsion of the purer blood into them; falling indeed exactly with it. But only accidentally, one might say, would it ever chance to fall so as to coincide exactly with the impulsive movement of the red-blood.

*Coincidence, in turn, of the contraction of the cortical-glands with the expansion of the simple or pure cortex; from which it follows that the spirituous fluid or highest blood, and the lowest or red blood, always act together, and act together coincidently with the expiratory action of the lungs; thus alternating with the time of action of the purer or intermediate blood, this latter always coinciding with the inspiratory action of the lungs.*

This contraction of the cortical-glands is coincident again with an expansion of the simple or pure cortex which is within them. In fact, it seems even to be brought about, partly and primarily *by* that expansion, as an inner cause working hand in hand with the outer. For when the pure-cortex within the cor-

tical gland *is in expansion,* swells, tumifies, inspires its own aura, and experiences the pressure of "the high spiritual" or mated-correspondent of its own degree down into it, it naturally must crowd against and partially fill up the central chamber or ventricle of the cortical gland in which it is resident. Now this is pretty much equivalent to "a contraction" of that ventricle, or *a lessening of its holding capacity,*—which comes to the same thing. This manifestly assists, and may even lead the way as an initiative and empowering impulse, in sending the *intermediate-fluid-protoplasm or animal spirit,* contained in that chamber or ventricle of the gland, flying down along "the fibre" issuing from the gland.

Of course, whenever in human beings the simple or pure cortex expands, the First Aura must come *sucking in* into it; pretty much as air does into the lungs when *they* expand. But it seems fully evident that it is *during the subsequent contraction of the simple cortex* (and consequent expansion or opening-again of the cortical glands), *that this new amount of First Aura* thus entering the simple cortex during its expansion (and there being formed into spirituous fluids)—would be poured or forced forth through those purest, simplest fibrils which are its own proper channels; by which it goes,—in part directly into the ventricular chamber of the cortical glands, there to form and reform and vivify the intermediate or purer blood; and, in part, to go to and be disseminated throughout the entire organism by way of those purest fibrils which form the interior and prior-part or plane of every tissue of the body. Thus at every breath, all life through, a certain positive increment of the human spirituous fluid goes on; which increment in early life is used to the growth of the body; and later,—in propagation.

But by the mechanism and operation of the organic structural parts,—treated of in the first paper of this series,—this contraction or systole of the simple or pure cortex must occur simultaneously with the expiratory action of the lungs. Thus it appears to be during the contraction or expiration of the lungs that the spirituous fluid is itself most powerfully and directly active down *in the bodily economy;* alternating thus, in moment, with the "activity" of the *intermediate blood.*

From these two things it follows that the *human spirituous fluid,* the highest "blood" of all,—acts *especially* and *in coincidence with* the *red-blood* or *lowest* and most ultimate blood of the body.

*Relations of the Bronchial artery to the Lungs and to the Pulmonary Artery.*

The Bronchial artery as compared with the Pulmonary artery is no "mere little side issue" to the lungs; it was there first; it was the parent of the lung tissue. And since all the body is woven of "fibres" and blood vessels, it is from the ramifications of the Bronchial artery that the vessels of the Pulmonary artery and vein themselves were woven, so far as vascular ramifications enter into or contribute to their contexture. The Bronchial artery is also always interior; has always the "inside track" in the structure and construction of the Lung tissue itself. In addition, because of the fact that its ramifications enter into the structure of all the vascular-channels of the pulmonary stream, it also goes to rule the entire pulmonic-tide, by means of its channels.

Thus by means of its ramifications, the Bronchial artery is *interior* in the organic structure of the lung where it formatively and nutritively rules (in so far as red blood contributes to nutrition). It is also *outmost,* about the stream of pulmonary blood; its ramifications embracing the channels of that stream; thus it has its hand at governing that blood also. Upon the lungs it acts from within; but upon the entering pulmonary blood, it acts from without.

Again,—its blood being pure, homogeneous, well-fed and full of spirit, it is always central; while the heterogeneous tide of the pulmonary vessels coming from the heart is always relatively sluggish, thick, mixed, and thus necessarily always relatively external. The Pulmonary blood thus does not enter to the "leasts" of the lung by any "central way," but approaches them always from without. And it still and ever remains without or external, relatively to the more central structure of the lung and the more central vitality of the Bronchial artery blood. *It is this Bronchial artery blood, coming thus as it were from a more interior ground* (since it comes out from the intimate

structure of the lungs), *into those least and last ramifications of the air cells* (where the sluggish mixed blood of the great venous tide brought from the right side of the heart by the Pulmonary artery, is spread out to feed and renew itself from the air), which here, by addition from its own purer tide, tempers the venous pulmonary blood and renders it fluid, nimble and active.

For this more-interior-and-purer Bronchial artery blood,—which, under the domination of the higher bloods, was the prenatal mother of the lung tissue,—always retains a like place, office, and function; not alone to the lung tissue *as a tissue,* during *all* the time of its experience,—but also in all those *operations of the living function of that tissue* which it enters upon at birth.

The Bronchial artery and its blood is thus mother to the lung tissues; it is primitive and perpetual former and nourisher of them, under the dominance and activity of the higher bloods. The Bronchial artery is carrier of pure, arterial, nimble, obedient blood; is ruler moreover of the entering tides of pulmonary blood, by virtue of being all around and about them, and having "the grip of its hand" round about the channels by which that blood enters; and, furthermore, by the addition, at need, of its own purer, more obedient, forceful and homogenous tides it tempers and renders "more human" the sluggish, mixed, muddy, more material stream of the incoming Pulmonary tide. Which service is sometimes greatly necessary to maintain the blood in the living activity of its ultimate functions in the economy. It presents then an instance of the "power" which ministered in the formation of the organic structure of the lungs, *continuing always to minister* to its sustenance; and its frequency.

Thus to the ultimate structure of the lungs upon the plane of the red-blood itself, *there are seen to come two streams of red-blood,* relatively inner and outer; with simultaneous action and reaction,—i. e., the stream of Bronchial artery blood and the stream of Pulmonary artery blood; both of which streams are manifestly impelled into the lungs at one and the same stroke of the heart. The Bronchial artery tide is the inner stream,

running to and into the intimate structure of the lungs, and coming to the pulmonary vesicles,—which are as it were the working ultimates of the lung-tissue,—from a relatively interior and central plane. The other entering tide, that of the Pulmonary artery, occupies a more external place always; even from nature.

*And it is by means of the simultaneous action and reaction* of this double tide of entering red-blood, Bronchial and Pulmonary,—that the fine structural units or living leasts of the ultimate lung tissue are kept in the freedom of a finely balanced equilibrium between two forces,—one acting from within, one from without. And by means of this equilibrium the entire lung is held securely under the dominion of the higher centers, and delicately responsive to the most finely decisive, guiding touch.

And by means of this living mechanism the lung is held in equilibrated freedom of response to the higher bloods, in spite of (even because of) the power with which the Heart impels its full tides from *both its sides* into that organ.

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## CRITICAL NOTES ON THE ESSAY, "IDENTIFICATION OF HYDROGEN AND THIRD FINITES."

An essay was read at the last meeting of the S. S. Association, New York, May, 1901, and published in the *"New Philosophy"* of October, under the above-named title. We preferred to write an independent article on the above problem, and sent it in for publication, but the editor suggested it would be more acceptable to take up the printed essay, and critically examine its suggestions, facts, references and arguments.

Note 1.—*Composition of Water—Leading Question.*

"The molecule of water is composed of hydrogen and oxygen gases."

"The molecule of water is composed of Third Finites and Fifth Finites." "Which of these two classes of finites constituting the water particle answers most nearly in its characteristics to hydrogen gas?" p. 115.

We answer—*Fifth* Finites, and not *Third* Finites, as given in the essay. Our answer is based on our personal knowledge of Experimental Chemistry.

When two volumes of hydrogen unite with one volume of oxygen, the combination makes only two volumes of water vapor; the one volume of oxygen has disappeared into the inner space of the hydrogen, and adds to the weight, but not to the volume of hydrogen. The two volumes of hydrogen remain the same as if no oxygen had been added thereto. Therefore, two volumes of hydrogen fills the general envelope and body of the water particle, and one volume of oxygen fills the *inside* space. So says Swedenborg, namely, that the *outside* volume is *double* the *inside* volume.

"According to the theory of water, the *internal cavity* is *half* of the space."

"If the internal cavity be equal to the volume which crustals occupy, and the diameter of the particle be 10, it follows that the diameter of the cavity will be very nearly 8; for 8 x 8 x 8= 512; and 10 x 10 x 10=1000."—(*Principles of Chemistry,* Part IX., n. 1.)

The essayist gives two diagrams, Figs. 1 and 2, of air and water, which we refer to for the sake of the explanation. "The large black dots represent Fifth Finites which form the *general envelope.* The *inside* minute dots represent Third Finites" (pp. 121-125). The essayist places hydrogen of two volumes in the inside, where Swedenborg in the passage above quoted from his *Chemistry* says the inside is only half the volume of the outside.

Note 2.—*Third Finites and Photosphere.*

"According to Swedenborg a relatively pure volume of Third Finites envelops the sun, and that a great volume of Third Finites exist around the Solar center. And that a certain volume of them is always maintained in existence there" (p. 119).

So says the essayist: Swedenborg defined his conception of solar matter as follows: "The Solar Ocean consists of the actives of the first and second finites. It is of these that the Solar Ocean primitively consisted and continues to consist even

to the present day." (*Principia,* Vol. I., p. 185.) The Third Finites are the only ones in immediate contact with these two solar actives, because they admit into their interior space the actual solar matter, which no other finites do or can do (p. 196). They are the only entities in actual touch with solar matter, receiving, collecting and storing up the full current of the solar force. And like the carbon points of a battery, becoming thereby incandescent and luminous, forming the Solar *Photosphere* (Vol. I., p. 196).

That is the place where they originate, and are converted into second or magnetic elementaries. The *Photosphere* is therefore a magnetic or second elementary phenomenon. *There* and there only is the place and location of the Third Finites—at the *Photosphere,* in actual touch with the solar matter. They have nothing to do with the Chromosphere.

The essayist places the Third Finites in the *Chromosphere,* under the impression that it is in immediate touch with Solar matter. This is entirely opposed to all spectroscopic experience. There is a plane of condensation where all the metallic vapors are congregated, which covers an open space of at least 1,000 miles in the lowest strata of the solar atmosphere, above which the Chromosphere rises to a height of from 6,000 to 10,000 miles. Hydrogen is the lightest and expands more and rises higher than any other of the many metallic vapors in the solar atmosphere.

Note 3.—*Fourth Finites and Chromosphere.*

At the close of the Third Finite Era, when the Solar Vortex was formed, there was no Chromosphere of Third Finites left as a refuse or surplusage; the supply ceased with the demand. Up to this period there was no Solar Atmosphere, nor any Chromosphere. Why? Because a solar atmosphere could not exist until the Vortex of the system was complete and filled with entities. For otherwise, there would have been nothing but a *vacuum* outside the atmosphere to press upon and hold it together. So with the Chromosphere; it could not exist until the solar atmosphere was created, in which it could float and be held together along with the other metallic vapors.

We have abundant confirmation in the fact so fully explain-

ed by Swedenborg, that the *Fourth* Finite Era brought into existence for the first time metallic vapors which crowded upon and covered the face of the *Photosphere* like a dense cloud, and finally brought about the chaos which gave birth to the planets and satellites. Swedenborg says all these things, planets included, were the products of the *Fourth* Finite Era, and which covered the Third Finites in the Photosphere like a dense cloud. This they do now, in the form of solar spots; but they are all *Fourth* Finite products, chromosphere included, and not Third Finites.

The essayist has located Third Finites in the wrong place—in the *Chromosphere* instead of the *Photosphere;* and also placed Third Finites there instead of Fourth Finites.

"In this manner the number and quantity of *Fourth* Finites more and more increase and *condense themselves* around the solar space (where the chromosphere and metallic vapors are now in the plane of condensation). They concrete into an immense volume and crowd around and enclose the sun so as to form an incrustation." (*Principia,* Vol. II., pp. 258-262.)

This is the work of the *Fourth* Finite Era, of which the Solar Atmosphere and Chromosphere formed a part. According to Swedenborg, in this passage, the Chromosphere with all its metallic vapors is without exception the work of the *Fourth* Finite Era. The Photosphere is the work of the *Third* Finite Era.

S. Beswick.

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## A NEGLECTED FACTOR IN THE DOCTRINE OF EVOLUTION.

Swedenborg, in both his Scientific and Theological Works, shows that the doctrine of *Series* is of great value in the development of a rational knowledge of the universe. The doctrine of Evolution is an attempt to apply the doctrine of Series to the origin of the world, and of animal and vegetable life, and of man. A similar attempt to apply the principle of evolution is made at the present day in nearly every field of human knowledge. Le Conte expressed his appreciation of this when he

said, that the doctrine of evolution was more than half of all science.

The doctrine of evolution is, however, a very different application of the doctrine of series from that given by Swedenborg. In the common evolutionary science, the point of view is from the senses and the world. It is a doctrine based on mere sense appearances, which are full of fallacies. Swedenborg, however, in his application of the doctrine of Series, uses it conjointly with the doctrine of Degrees; so that the doctrine of Series and Degrees conjointly is as it were the key to unlock the door by which the mysteries of the universe are unravelled. In presenting this doctrine to the world, he says:

> I purpose to give an introduction to rational psychology consisting of certain *new doctrines*, through the assistance of which we may be conducted from the material organism of the body to a knowledge of the soul, which is immaterial. These are the Doctrine of Forms; the Doctrine of Order and Degrees; also, the Doctrine of Series and Society; the Doctrine of Influx; the Doctrine of Correspondence and Representation; lastly, the Doctrine of Modification. (*Animal Kingdom*, n. 14.)

It is my purpose in this article to call attention only to the doctrine of Series in conjunction with the doctrine of Degrees, in order to point out a serious defect in the rational coherence of the theory of evolution as now taught and accepted in the Scientific World. Swedenborg says:—

> The Doctrine of Series and Degrees is designed "to teach the nature of Order and its rules, as observed and prescribed in the succession of things; for the rational mind, in its analytical inquiry into causes from effects, nowhere discovers them, except in the subordination of things, and the co-ordination of subordinates; wherefore, if we would advance from the sphere of effects to that of causes, we must proceed by Orders and Degrees, agreeably to what rational analysis itself both approves and advises." (*E. A. K.*, II., 519. See *A. K.*, 67, 161.)

And he says:—

> But whereas all things in succeeding each other, follow one another in order, and whereas in the whole circle of things from first to last there is not a single one which is altogether unconnected or detached from the rest; I am therefore compelled, as I said, previous to developing the subject of Rational Psychology, to take into consideration this doctrine concerning order and connection, so remarkably conspicuous in the animal kingdom. (*E. A. K.* II., 579.)

Swedenborg here identifies the idea of Series with that of Order itself. He shows that all things are connected together in a certain order of succession, and hold a certain relationship

to each other. What is produced from one is in a subordinate position to it. Various subordinate things have a relationship to each other which is that of co-ordination or arrangement of subordinates. Thence exists the relationship of cause and effect. The rational faculty of man is delighted with the perception of the relationship of things in their series of succession, subordination and co-ordination. It is on account of this that the theory of evolution has gained so wide an acceptance in the scientific and philosophic world. It is because the facts of nature have been arranged in series as of cause and effect, and each of the series is assigned its place, like links in a chain, and the rational mind, on seeing this connection, concludes that they hold the relationship of cause and effect. From what has now been said it may be seen that the science of Series in connection with that of Degrees will give us important and indispensable tools for the use of rational analysis, opening the way for the perception of causes, removing those things which produce obsecurities and which lead the mind astray.

By the doctrine of Degrees Swedenborg shows that as we ascend from the fixed and lowest forms of nature, we come to forms and substances more and more perfect, which are the subject of more perfect and more active forces. Thus we ascend by degrees from lower to higher. The higher are also the origin or cause of the lower. For instance, all the solid and fixed forms in nature may be traced back to liquid and gaseous forms. There are also ascending degrees of atmosphere. As we ascend we come to more active and perfect forces, as sound in the lowest, heat, light and electricity in the next above; and magnetism and gravitation in the highest. In addition to these material degrees and powers, we learn from his theological works that there is a discrete degree of substance above matter, namely, spiritual substance. This also has its degrees of altitude corresponding with those in nature; and its powers and forces ascend in perfection, according to degrees. Inmostly in all these the Divine operates, giving life, activity and power to the inmost, and mediately through this successively to the lower and lowest. In the first place the substances themselves were created in successive degrees from highest to lowest, and after their pro-

duction the lowest is the containant of the higher. Matter is the conglobation and aggregation of spiritual substances, so that it originates from spiritual substance, and is adapted to the reception of its forces and powers.

This doctrine of Degrees shows the distinctions and differences of substances and forces in the order of their formation. But the doctrine of Series shows how one thing is connected with another as links in a chain of causation. Thus we read:—

> The universe is a work continuous from the Creator even to ultimates, and because a continuous work, which like one thing linked together, it depends on and is actuated and ruled by the Lord, who is the common centre. . . . The first proceeding is continued even to ultimates by discrete degrees, altogether as end through causes into effects, or as the producing and the produced in a *continuous series.* (Angelic Idea of Creation.)

After creation, this continuity of series by discrete degrees remains, so that every particle of matter or form organized thereof is in a similar series, into which the forces and powers of the Divine Love and Wisdom continually operate. Thus besides the series of things on the plane of nature itself, by aggregations and combinations of matter, and by the changes effected by natural forces, we have another series ascending by discrete degrees, by which all things are connected with the First, and are recipients of the interior forces from the Divine Being.

To illustrate this in the case of man, whom the evolutionists regard as a product of material forces alone. They trace his origin from protoplasm, through all gradations of animal life to man. They teach that this is portrayed in the production of the individual embryo from the cell, passing through similar gradations in which they perceive the stages of the simple cell, the worm, dog, monkey and finally man. All these changes are by them ascribed solely to physical forces and heredity. What light does Swedenborg throw on this problem? Of the formation of the chick in the egg, he says:—

> In the formation of the embryo in the womb, or the chick in the egg, all things are carried on most distinctly. And the several members are produced successively, or one after another. . . . There is a certain formative substance or force, that draws the thread from the first living point, and afterward continues it to the last point of life. . . . This formative substance . . . is the first, the most perfect, the

most universal, and the most simple of all the substances and forces of its kingdom; and it has assigned to it, within its own little corporeal world, a certain species of omnipresence, power, knowledge and providence. . . . The veriest formative force and substance is the soul; next in the order of forces and substances is the spirituous fluid; next the purer blood; and next the red blood, which last is thus as it were the corporeal soul of its own little world. *Thus all these may be called formative substances and forces;* that is to say, each in its own degree; while the one vital substance, which is the soul, presides and rules over all. (*E. A. K.* 247.)

Where then does this one vital substance which is the soul, come from, that moulds and forms the body? Swedenborg teaches in the *True Christian Religion* that:—

The soul is from the father and the body from the mother; for the soul is in the seed of the father and is clothed with a body in the womb of the mother; or what is the same, all the spiritual part of a man is from the father, and all the material part from the mother. (*T.* 92.)

And he adds a little further on:—

The soul, which is from the father, is the real man, and the body, which is from the mother, is not the man in itself, but by derivation from the soul, and is only the clothing of the real man, composed of such substances as belong to the natural world; whereas the soul is composed of such substances as belong to the spiritual world. (*T.* 103.)

How this soul is formed and embodied in the seed that it may be transmitted to the ovum, he thus describes:—

The human seed is interiorly conceived in the understanding, and is formed in the will, and is thence translated into the testes where it clothes itself with a natural covering, and is thus conveyed into the womb, and from thence into the world. (*T.* 584.)

Moreover this soul, thus formed, is organized of the substances of the three degrees of the spiritual world (See *D. L. W.*, 432), and at the first conception, the Lord conjoins himself with man in the womb, and forms the embryo, by inflowing with His power through those degrees of substances. (See *D. Wis.*, III.)

In view of these principles, we may see that in man's formation there is a series of degrees of substances and forces in most perfect order, by which the formation in the womb takes place. *This form is essentially human,* and moulds all things to the human form. The judgment of the evolutionist from the mere outward shape of the partially formed embryo is thus seen to be grossly sensuous, not approaching in the slightest degree to the perception of the active influences at work in the formation of the body.

Again it is one of the principles of the doctrines of Series and Degrees, that the first rules and governs all things after the formation. Thus the soul, consisting of will and understanding in its degrees, rules and actuates all things of its body. Every act and motion of the body goes through a similar series as in the original formation. The mind conceives and wills, flows into the body, and gives the power to act, without which no sensation could be perceived in the body, nor could any motion take place. Thence it may be perceived that there is a series of substances and of forces connecting God with the ultimates of nature. Of these substances man is organized. He receives life from God by which he has intelligence and will to act in the world. Every thing of his life is an operation in these degrees, the visible body being only the plane of effects, the causes and active forces being on the plane or degree of the spiritual substances, of which the soul is composed. The doctrine of evolution has neglected this factor in the problem of creation, and therefore its conclusions as to the origin of man are invalid, because the most essential factor of the problem is left out.

Rev. John Whitehead.

## NOTE AND COMMENT.

From the Massachusetts New-Church Union (Boston) comes, as we go to press, the new translation of Swedenborg's *Ontology,* translated and edited by The Rev. Alfred Acton, Professor of Theology in the Academy of the New Church. The preface gives an account of the history of this valuable little work and its place among Swedenborg's physiological and metaphysical MSS., incidentally classifying those documents in a manner which will gratify the uninitiated reader. The features which distinguish this translation are enumerated, and the uses of the work are indicated,—as throwing important light on the development of Swedenborg's mind; as furnishing to his readers "illustrative and confirmatory ideas" by which spiritual truth may be more effectively established; and especially as giving us a Definition of Philosophical Terms used by the author in his other writings, theological as well as scientific. Biographical notices of Dupleix and Baron

are given, two little-known authors, whose philosophical principles Swedenborg quotes in the work. An index appropriately concludes the brochure, which is handsome in appearance, contains 59 pages, and is sold for 50 cents.

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The writer of the "Critical Notes," which we print on another page, appears to have grasped neither the universal laws of the *Principia* nor the meaning of modern experiment in the synthesis of water by combining oxygen and hydrogen gases. In Note 1 he concludes that the *grosser and more inert* oxygen constitutes the *inside* space of a particle of water, and that the envelope is composed of the *relatively lighter and more active* hydrogen! Every student of the *Principia* will remember that the relatively lighter and intangible substances always occupy the inside space; this is one of the fundamental conceptions. Furthermore, the *figures* in both the *Principles of Chemistry* and the *Principia* leave no doubt as to the relative positions and volumes of third and fifth finites. Passing over the statement that the combination of two volumes of hydrogen with one of oxygen produces "water vapor" when in reality it produces *water,* it should be noted that the two volumes of hydrogen do *not* "remain the same as if no oxygen had been added thereto." The fact is that *the volume after combination is very much reduced.* If the objections in Note 1 are not based on facts, those contained in Notes 2 and 3 necessarily fall to the ground. But to fully expose the misinterpretation much space would be required. We would here note only the reference under Note 2, to the *Principia,* Vol. i, p. 196, that the third finites "admit into their interior space the actual solar matter." Third finites do nothing of the kind. The passage teaches that MANY third finites surround the solar actives *to form the second elementary particle.*

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*The Theory of Evolution and New-Church Philosophy: H. Clinton Hay, in "New Church Review" for October.* The writer of this paper points out most clearly that the evolutionist recognizes only continuous degrees in the theory of the origin of living forms. He makes a most earnest plea for the consideration of the doctrine of discrete degrees in the solution of this problem. After quoting Haeckel in favor of pantheism, he says:—

"Here where one would least expect it, the theory of evolution strikes nearest, in its vital and fundamental relation, to New Church philosophy. Here evolution in its extreme of materialism, in utter spiritual blindness, comes face to face with the fundamental verity of creation as taught in the New Church, and shows that it cannot make another step of progress in this direction until its eyes are opened to a knowledge of the great doctrine of discrete degrees." p. 489.

All which is very true, yet how very far apart these two conceptions are. The similarity consists only in the fact that the forces operative are

within the ovum. The difference involves the existence of God as a Divine Man, and the spiritual world as the world of causes.

The writer at times, in his desire to find points of similarity between Swedenborg and the evolutionists, evidently misinterprets Swedenborg. He identifies Swedenborg's doctrines of the creation of seeds, with the first cells or protoplasm (p. 490), quoting *D. L. W.* 312, in substantiation of his contention. Swedenborg undoubtedly teaches that "the first production of the earths was seeds." These seeds were not cells. The seeds were true seeds, producing each its own species. This teaching is repeated in other parts of his writings, where he also teaches that such seeds are produced at the present time under the proper conditions.

The writer at times seems to endorse the doctrine of the evolution of one form from another, for on page 485 he speaks of the ascending series of creation from one celled to many celled, and from worms, fishes, insects, reptiles and birds to man, and says: "We are impressed with the significance of the confirmation found by evolutionists in the story told by the embryo of man's progress from two cells or seeds, made one, unfolding through all the periods of animal creation, from the gastrula to the infant, from moneron to man." Here and in a few other places, as on p. 493, the writer seems to have been touched by the poison of the serpent of sense appearances. He can find nothing in Swedenborg inculcating the idea of two seeds in the formation of man. The seed is not a cell, but is the soul covered with pure material substance that it may be conveyed to the ovum. The ovum is in no sense a seed. The formation of each living thing from start to finish is dominated by that special form alone. Man is human throughout, and partakes in nothing whatever of the nature of "worms, fishes, insects, reptiles, birds and beasts." (p. 485.)

Again he confounds the doctrine that use forms the organs of the body, as propounded by Swedenborg, with that of Darwin. The two ideas are as wide apart as the poles. Swedenborg's idea is that an internal principle of use from the Lord forms the members to correspondence with itself. Darwin's idea is that some extraneous circumstance can destroy or make members and organs.

Another error in the paper is where he says that Swedenborg teaches that "there is in the mineral kingdom an endeavor to produce and sustain the vegetable,—in the vegetable to produce and sustain the animal, and in the animal to produce and sustain man." p. 490. The conatus in the mineral kingdom is the creative force to produce seeds, of which see above. In the vegetable kingdom, from the spheres of the plants the creative force produces corresponding insects; not that one form of life produces another by gradual changes, as evolutionists teach. The endeavor in each plant and animal is to produce its *own kind,* and the same is true of man; thus the law in Genesis I. is fundamentally true. (See *A. C.* 3610, 3648, 5116, 5173; *F.* 16; *W.* 269.) The paper fails in

not carrying out the fundamental idea of discrete degrees with which it starts out. The writer also needs to connect more fully with it the doctrine of series, by which every form of life may be seen to derive its origin from the Creator by discrete degrees, and then by its implanted conatus it continually produces in series those of its own kind. J. W.

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*The Creation of First Forms.* George H. Dole, in *New Church Review* for October. In contrast with the above mentioned paper, another appears in the same *Review,* in which the writer takes the same principle of creation by discrete degrees, but carries out his principle consistently. He says, "Evolution and creation by correspondence are in essence exactly opposite. The former commences with lowest forms of matter and force and derives creation from chance working upward. Creation by correspondence commences with the Creator, the highest, and derives creation from Him through spiritual laws and forces working downward." (p. 537.) His statement of the formative force in nature is thus expressed: "As the spiritual world is within the natural world actuating it, so the spiritual counterpart of plants and animals is within the material part animating and forming it." (p. 541.) The paper is short, but clear and consistent, and its teachings are well calculated to correct the errors in the other. J. W.

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In a paper on the Vermiform Appendix read before the Annual Meeting of the Rocky Mountain Interstate Medical Association, last September, Dr. E. P. Hershey surprised and shocked his audience by asserting that this supposedly useless little organ secretes a fluid for the lubrication of the cæcum. The discussion that followed was by no means favorable to the views expressed in the paper, some of the speakers manifesting almost rancorous opposition to accepting the paper at all, though a few admitted the plausibility of the arguments it put forward.

The fact that Swedenborg ascribed this function to the appendix over a century ago is well known to students of his writings. In the *Animal Kingdom* (published 1744, '45) Vol. I, No. 138, he says: "The *Appendix cæci vermiformis.* . . . pours a new liquid adapted for annointing and lubricating the wavy folds of the colon, and particularly for macerating the fæces, into the fundus of the cæcum and the gorge of the colon."

Whether Dr. Hershey obtained his cue from Swedenborg we are unable to say as this writing. If he did not, one more is added to the already numerous instances of a modern scientist rediscovering a fact which was in reality first brought to light by the inimitable Swedish Philosopher. H. F.

## PROF. HUGO MUNSTERBERG AND THE DOCTRINE OF THE DISCRETE DEGREES OF MIND AND MATTER.

In one of his recent Lowell Institute Lectures on Psychology, Prof. Munsterberg. of Harvard University, made some statements very interesting to students of Swedenborg, as showing the convergence of the modern psychological doctrine of the psycho-physical "parallelism" and the "con-comitancy of action" in brain and thought, to Swedenborg's doctrine of discrete and incommunicable degrees of mind and matter and their relation by correspondence and influx.

Speaking of our present knowledge of the relation of mental efforts to special brain processes he says,—as reported in the Boston *Transcript:*

"The number of commonly accepted facts is still surprisingly small and the most important problems are covered by contradictory theories. There is no agreement as to whether motor centres exist in the brain, besides the sensory centres, or whether every sensory centre is motor at the same time; whether the sensations in perception go on in the same brain parts as the memory-ideas, whether the whole context of the brain is devoted to conscious processes, or whether,—as a brilliant new theory maintains in opposition,—four-fifths of the context processes have no mental accompaniments at all, but serve merely for the connection of psychical phenomena. . . . . Yes, we do not even know whether the cells are the seats of the conscious processes or whether those are right who think that the finest nerve fibrils are the seat of the psychical sensations, while the cells have trophic functions. And since the recent methods of psychology have proved that certain cells are able to make movements like a little amœboid protist, we hear from one side that the cells are extended when we are active, and from the other side that extension characterizes rest. We must know this lack of agreement to appreciate fully the humor of the situation when in teachers' meetings the most arbitrary schemes for education are sometimes recommended on the basis of physiological cerebral facts."

In this connection see Swedenborg's work "On the Soul," numbers 26, 42 and 118, and the Theses IV. and IX. appended to the same work by the English translator, pp. 350, 358. In these numbers Swedenborg states that "it may be demonstrated from anatomy that the universal nerve of the senses is one which arises immediately from the cerebrum, just as the universal nerve of the natural motions of the body, or the intercostal nerve, arises from the cerebellum." (No. 42.) He speaks of the "nerve of the fifth pair as concentrating the fibres both of cerebellum and cerebrum and therefore as both a sensor and motor nerve. As to expansion and retraction of the cells, Swedenborg in No. 201 "On the Soul" describes the expansive effect of joy, or of pleasure. In joy the sensorial organs are animated and the "whole body before constrained swells freely in joy. Through the general expansion, by extended swellings of the cortical substances of the cerebrum, each in-

ternal sensory also is expanded. . . . Thus through joy all ways of communication are opened. . . A lively trembling and light in the countenance is manifestly betrayed by the eyes and by the speech itself and every action, thence also the brain is cleared, restored, and vivified, and in that moment glides back as it will into the state of its first youth and innocence."

Professor Munsterberg goes on to define the need of science to be that which Swedenborg defines as Correspondence, but which the modern psychologists have called the "psycho-psysiological parallelism." And this parallelism, he says, is utterly misunderstood if it is interpreted as a kind of materialism.

What alone prevents it from being materialism is the hypothesis ot a discrete degree existing between mind and matter, and that true "cause" belongs always to the degree of mind and never to the degree of matter—thus always to the logical plane of action and never to the physical. By a strange inversion of terms which we wonder at so discriminating a mind as that of Professor Munsterberg accepting without protest,—the higher degree or logical plane is treated here as "states of the brain which are causally connected" and the lower plane as psychical; and the inversion appears in equally objectionable shape in the statement that "mental life cannot be explained psychologically if it does not borrow causal connection from the physical world." Here together with the very important admission that the degree between mental and physical activity is discrete as between the two parallels which never converge is the faulty association of "causal connection" with the physical world instead of with the mental. And this is in direct contradiction with his statement that the connection of the thoughts of an inner life or that by which "one plan demands another" is a logical connection. For this logical demand of "one plan for another" is the true instrumental cause of every effect which takes place in brain or body or the physical universe.

Professor Munsterberg goes on to define the theories of "adjustment between known brain facts and known mental facts" as three, viz., the association theory, the apperception theory and the action theory. The first may be called the "habit of nerve substance," which is rather another name than an explanation. The apperception theory is that of special powers of attention belonging to special centres in the brain. The action theory "considers every idea a starting point of mental impulses." According to this theory, which combines the good sides of the two other theories, the sensation is an accompaniment of a brain process in which a sensory impression is transformed into a mental impulse, and while the quality and intensity of the sensation is dependent upon the impression, the vividness of the sensation is dependent upon the possibilities of motor discharge.

Swedenborg in the Ninth Thesis on the Soul, in *Economy of the Animal Kingdom*, Pr. II; quoted in work *On the Soul*, p. 358, proposes the

theory, "that the operation of the soul in the organic substance of the brain is the mind: the affection of the entire brain or common sensory is the animus; the faculty of feeling is in the sensory organs; the faculty of acting in the motor organs, and that a diligent and rational anatomical inquiry ought to show the nature of the intercourse between the soul and the body; and prove that the soul can communicate with the body but through mediating organs and indeed according to the natural and acquired state of such organs."

Professor Munsterberg rightly says of the theory of distinct nerve centres for the starting and inhibitions of mental life:

"The shortcoming of such a theory is the inability to explain how this mysterious centre can adjust and adapt its decisions and impulses to the totality of experience."

In other words, unless there is a consciousness of the "end" or what Aristotle calls the "Good," how can there be any talk of adjustment or adaptation. Professor Munsterberg, in making every idea a starting of mental impulses and so concluding that "we are thinking merely in so far as we are acting," progresses so far towards the cause of action as to find it in the idea. Swedenborg goes beyond the idea to the perception of the end or will which animates the idea and gives it its originating activity. This Swedenborg develops in his later spiritual philosophy, but he defines it in a measure in the Seventh Thesis (*On the Soul*, p. 358) in the following progression:

"The genuine progression in descending and ascending appears to be in this wise. As the forms of the modulations or sounds of the air in the ear are to the forms of the modifications or images of the ether in the eye, or in the animus, so are the latter to the forms of the superior modifications in the mind, which forms are termed intellectual and rational ideas, in so far as they are illumined by the light of the soul; and so again are these forms of the minds to similar supreme forms, inexpressible by words, in the soul, which forms are termed intuitive ideas of ends, in so far as they are illuminated by the life of the first cause."

F. S.

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*The Monist* on Kant and Swedenborg. Dr. Paul Carus, the editor of *The Monist,* devotes six pages of his article on Kant, in the October number, to a discussion of the indebtedness of that philosopher to Swedenborg. While admitting that Kant was undoubtedly influenced by Swedenborg in his doctrines of time and space, Dr. Carus thinks that the influence was overestimated, and that speculations on such subjects were so common in Kant's time that it would be difficult to specify any single influence. He makes the common mistake however of treating Swedenborg's influence on philosophy as mystical, rather than profoundly scientific, an error corrected in the *Encyclopædia Brittanica's* article on Mysticism, and one that no one acquainted with the rigid mathematical methods of Swedenborg's discussion would fall into.

# THE NEW PHILOSOPHY.

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## ANALYSIS AND REVIEW OF THE "WORSHIP AND LOVE OF GOD."[1]

### INTRODUCTORY.

IN order that we may acquire a true conception of the quality and value of the *Worship and Love of God* it is of the greatest importance to view it in the series of scientific and philosophical writings of which it was the last to be produced.

Within the last two years attention has been very forcibly drawn to the great value of the works on science and philosophy which came from Swedenborg's pen, before his illumination and inspiration as the Servant of the Lord in His Second Coming. It has been shown that the natural truths announced in those works are in full agreement with the Spiritual and Divine truths of the theological works, where they are frequently restated in general and particular, and which truths they fit as the glove fits the hand, and clothe as the body clothes the mind and soul.

These scientific and philosophical works may be divided into two grand series, *first,* those dealing with the *macrocosm,* or the universe as a whole; and, *second,* those which explain the

[1] Read at the Regular Meetings of the Principia Club for December, 1901, and February, 1902. In the references *W.* denotes the *Worship and Love of God* (1885), and *D.* Dr. R. L. Tafel's *Documents concerning Swedenborg.*

*microcosm,* or man, according to the universal laws formulated in the first series. The importance of the *Worship and Love of God* is seen when it is known that in it are brought together the results of both series; it is the synthesis of all of Swedenborg's previous scientific and philosophical studies, epitomized in a representative and oft-time correspondential form. In addition, it contains a number of doctrines not previously treated in full, especially in regard to the creation of men, animals and vegetables, the spiritual world, spiritual heat and light, and the spiritual sun.

It will readily be seen that a complete examination of the doctrines contained in the *Worship and Love of God* involves an examination of the whole system of which it is the epitome. To do this fully very much space and time would be required; therefore, in this paper only some of the fundamental doctrines will be considered and an account given of the unprinted *Third Part,* lately transcribed and translated by the writer. In conclusion, a general review and an historical and bibliographical sketch of the whole work will be given.

### THE DOCTRINES OF THE "PRINCIPIA" RESTATED.

An interior and complete comprehension of any subject cannot be acquired without entering into its first principles, for those things which are first are also the most interior. The interiors are understood when the mind sees how universal laws are operative in singulars or leasts. For this reason Swedenborg was prepared to understand the creation of the universe as a whole, and of man in particular, by studying for many years the constitution and activities of the interiors and leasts of nature, the sun and atmospheres, by which the earth with its kingdoms and finally the human body are first created and afterwards held in a state of integrity. Consequently, in the *Worship and Love of God,* whose special object is to teach the doctrine of the creation and preservation of man, the reader is first invited "to contemplate the face of the universe in the mirrors presented by the singular things of which it is composed," so that from them "the stated circumstances of times and of ages" may be unfolded.[2]

[2] *W.,* n. 2.

Besides the many places where it is stated that there are degrees of substance in the interiors of nature, as where auras, ethers, atmospheres and their properties are mentioned, the process of creation as given in the *Principia* is clearly outlined.

The "first substance of the world" gave birth to the starry heavens.[3] The planets were formed on the surface of the fiery solar mass and sent forth to gyrate about it. As to the mode of origin of the children of the sun, or the planets, it is said:

> Nevertheless it was impossible he could carry in his burning focus, and afterwards bring forth such heavy and inert productions, and therefore such burdens must have been the effects of his exhalation, and of the powers thence flowing and efficient. Hence it follows, that the sun primitively was overspread with effluvia excited and hatched by his real eradiation, and flowing together in abundance and in every direction to him, as an asylum and only harbor of rest; and that these fluids, in process of time having condensed, there existed a surrounding nebulous mass, or a mass like the white of an egg, which, with the sun included in it, would resemble the GREAT EGG OF THE UNIVERSE.[4]

In this way a kind of crust or shell was formed about the solar mass, and from the crust—when it burst, from "the inward heat and agitation"—the planets. In one of the notes Swedenborg further describes the incrustation of the sun and formation of planets as follows:

> It is manifest that similar incrustations have also not unfrequently appeared in the starry heavens; for occasionally new stars have been seen, shining with great brightness, and presently by degrees growing obscure, yet afterwards either returning to their former splendor, or altogether vanishing; which is a sure proof that those stars, in consequence of a conflux of parts excited by their exhalation, have been covered over with a similar crust, which would either be dissipated, or would altogether hide them so as to withdraw them from our view. Besides, if we compare the immense magnitude of the sun with the planetary bodies which revolve around him, we may easily be instructed, by a slight calculation, that such a surrounding crust would have sufficed for producing so many and so large bodies. This egg was the chaos, so famous in old time and at this day, consisting, as is supposed,

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[3] *W.*, n. 6, note b.

[4] *W.*, n. 9.

of the elements of all things in a heap of confusion, which afterwards being arranged into the most beautiful order, produced our world.[5]

The planets began their gyrations about the sun because they were in the flux of an ether. That this ether is none other than the magnetic element or aura of the *Principia* is proved by the statement that—

Both the declinations and inclinations of the magnet, as well as its attractions, which are so many visible effects of the determination of that ether, confirm also the same conclusion.[6]

Elsewhere the first element or aura of the *Principia* also may be identified, for it is taught that the spirituous fluid was formed by a determination in the "supreme aura of nature," [7] which is thoroughly in harmony with the doctrine of the blood as given in the *Economy,* and elsewhere.

The luminiferous ether, or third element of the *Principia,* may be identified with one of the "middle" ethers, where it is said that "nature, taking her birth after an egg, and from an egg, first excited the supreme and most simple auras or atmospheres, also middle ones, and finally the last or ærial." [8] It is also said that "ether produces light." [9]

The fourth aura, or the ærial element of the *Principia,* is said, according to the poetical language of the *Worship and Love of God,* to have been produced by a marriage of the active principles of nature with the passive ones:

For two principles of nature were now come to their birth and luxuriance, viz., active principles and passive, the former of which filled the whole universe, for ether was the atmosphere of such principles or forces; but the latter, or passive principles, were heaped together into one, and constituted globes suspended and equally balanced in the centres of the circumgyration of the active forces. But these principles were to be joined together, and one was to be given to the other in a kind of marriage, that a new and mediating atmosphere

[5] *W.*, n. 9, note d. This statement of the formation of planets from a solar chaos has recently been confirmed by the remarkable observations, in America and Germany, of the new star in the constellation Perseus. Cf. *Astro-Physical Journal,* September and November, 1901; *Proceedings Royal Society,* Vol. lxix, Nov. 19, 1901; *Science,* Nov. 29, 1901; *Nature,* Nov. 22, 1901.

[6] *W.*, n. 11, note g.

[7] *W.*, n. 33.

[8] *W.*, n. 22, note o.

[9] *W.*, n. 13, note h.

might be conceived, which might proximately encompass the orb, etc. . . . After that this atmosphere was hatched from the most attenuated principles exhaled from the bosom of the orb, and married to ether, and thereby began to temper the heat which flowed from the fiery fountain so near at hand, then our liquid orb began to contract a crust, or to be superinduced with a kind of coat, at first rare or attenuated, but presently denser, which continually increased according to the affluence of the parts emerging from beneath: for as yet it boiled from its very bottom. The orb being carried around, and, as it were, clad with this superficies, then first assumed the appearance of an earth, and induced a clean and beautiful appearance, for it was a perpetual plane, without spots or hills and valleys, one sphere without a boundary, which was divided by rivers and streams springing up from hot baths; and being overspread on all sides with a dewy mist, which entered the new-born atmosphere, and relapsing into the warm bosoms of the earth, cherished it with continual vapour.[10]

A page before the above quotation it is said that the globe was as yet "not earth, but an uncovered wave, the whole being without a shore or slime, and thus a large fluid heap of principles of inert nature," which, it is said, must have undergone innumerable changes before "these principles or elements of inert and heavier nature might coalesce into secondary new principles of water, salt, earth and the like."

Here, then, is an outline of how the earth was produced and prepared for the production of the vegetable kingdom, and a comparison shows that the doctrines of the *Principia* have been restated in regard to the sun, atmospheres, planets, and the final production of water, salt and earth. The restatement of the doctrines of the *Principia* in regard to light and heat will be considered later.

### SEEDS, PRODUCTION AND PROPAGATION.

In the production of anything there are two states which invariably follow each other; the *first* is the formation of a chaos or egg in which the *second* state is fulfilled, when the product has been formed and issues forth. It has been seen how the earth itself was produced from the solar chaos and it will now be shown that in the new series the earth itself is the chaos in which *seeds* are produced and from them in turn the vegetable and animal kingdoms. The earth was like a—

[10] *W.*, nos. 13, 14.

. . . kind of new egg, but which was laden with as many small eggs collected at its surface, or small seeds of its future triple kingdom, viz., the mineral, the vegetable, and the animal. These seeds or beginnings lay as yet unseparated in their rudiments, one folded up in another, namely, the vegetable kingdom in the mineral kingdom which was to be the matrix; and in the vegetable kingdom, which was to serve as a nurse or nourisher, the animal kingdom; for each afterwards was to come forth distinctly from their coverings.[11]

Elsewhere it is said that the earth—"as an ovary, contained together, and in one complex, all the offsprings of its kingdoms, and by means of the fecundating spring hatched one in order from another." [12]

Compare this teaching with the *Divine Love and Wisdom*, n. 312, where, after many universals concerning the first productions from earths are given, it is said that *"The first production from those earths when they were still fresh and in their simplicity was the production of seeds; the first conatus could not be any other."* The *Adversaria* also says that at one time the crust of the earth was filled with seeds from which the vegetable kingdom was produced.[13]

How were these seeds produced? In general the answer of the *Worship and Love of God* is that they were produced by a spontaneous generation in the earth, of the auras determined into it, i. e., the atmospheres, *"or their individual forms or substances, which are the most active forces of the universe, she [nature] conjoined, by the mediation of the sun's rays with the principles of the earth, endowed of themselves with no activity; and thus she conceived new forms, which being enclosed in seeds, were to be the most fruitful principles of new fœtuses or productions."* [14]

It should be borne in mind that the seeds and their offspring were brought forth in a most favorable climate, for there was a perpetual spring on account of the earth's rapid revolutions and proximity to the sun. Under these circumstances—

There was a time therefore when the vegetable offsprings first of all burst forth from the seeds wherein they were deposited; and when the animals themselves, both those which swim and fly, and also those

[11] *W.*, n. 15.
[12] *W.*, n. 28.
[13] Vol. I., p. 3.
[14] *W.*, n. 22, note o. Cf. n. 20, note m.

which creep and walk, were unfolded from their first wombs and eggs, etc.[15]

The animals were produced by the formation of new ovaries in the vegetables, in which they were formed and nourished by the finest juices and essences.[16] The conatus to do this lay inwardly concealed in the generating nature of vegetable seeds.[17] After the first production, however, of the vegetables and animals, each species propagated itself, either by seeds, eggs, or ovaries. In them are gathered the prolific principle and thus by a new growth the species is continued. This is taught as follows:

All formations, as was observed above, agree in things most general, and especially in this, that inmost or purest principles, which are essences themselves, or essentials, when they have unfolded themselves in suitable forms, even to ultimates, by wonderful insertions betake themselves to inmost things; as seeds, when they have put themselves forth into leafy trees, afterwards concentrate the purest essences of their juices again in new seeds; in what manner they betake themselves towards inmost principles is presented to view in the fruits themselves; for in the inmost parts of the fruits they form to themselves repositories, and encompass these and themselves in foldings and membranes; in these lie the veriest seminal powers themselves, which do not burst forth until the foldings are laid open.[18]

How absolutely this agrees with the teaching in the theological writings, that propagation is but the continuance of creation; and with the same law stated under another form, that preservation is perpetual creation, or subsistence is perpetual existence! The latter form of this law is also repeatedly stated in the *Worship and Love of God,* as where it is said that "every effect is a continuity of causes from the first cause; and the cause by which anything subsists is continued to the cause by which it exists, since subsistence is a kind of perpetual existence;" [19] and elsewhere that "subsistence is perpetual existence, and perservation is perpetual creation," [20] "for we subsist from the principle which gave us existence, and we are renewed by that which first made us new." [21]

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[15] *W.*, n. 18.
[16] *W.*, n. 24.
[17] *W.*, *Ibid.*
[18] *W.*, n. 55, note r.
[19] *W.*, n. 7.
[20] *W.*, n. 57e; *et passim.*
[21] *W.*, n. 62.

In the formation of a seed and the production of a vegetable or animal from it and the subsequent formation of new seed, is mirrored the order of the universe, the whole series of involution from firsts to ultimates, and from them the evolution and revolution to firsts. This creative order of involution and evolution is fully developed in the *Worship and Love of God* as follows:

For all and singular the things in universal nature, and in each of the kingdoms which have a determinate course, perform and accomplish revolutions of this sort, viz., they commence from their first natures and from them proceed in order to last or lowest things; and when they have there established new principles, they return from them in a like order to first or supreme things; so that they descend, and from newly excited principles ascend: this is a constant effect, not only in the vegetable kingdom, but also in the animal, which kingdoms, in their most general principles, have reference to, and resemble, each other.[22]

Whatever is born from seed or an egg . . . is bound to run through this revolution or orb: Plants, flowers, and trees, from their seed, unfold their nature, and grow into trunks or branches as into their bodies and ultimate members, and from these return again to their beginnings, or conceive and hatch seeds; so that all the revolution which they perform is only a kind of excursion of mediating causes, to the intent that they may return to their first principles, and thus bring forth fruits or uses. The case is similar in the animal kingdom. Such an order also existed and was derived from the grand egg of the world; for seeds and ovaries took their beginnings from the first and most perfect nature, and their increments from posterior and more imperfect nature; but by an inverse method they unfolded themselves from ultimate to first principles; in like manner also the fœtuses of the animal kingdom.[23]

### THE FIRST MEN AND THEIR PRIMEVAL STATE.

When the vegetable and animal kingdoms had been successively produced, as described in the preceding section, and all things were in a most beautiful and flourishing state, the earth "being enriched with its living creatures, and so amply furnished and adorned with delightful fruits," [24] and all things delightful to the senses were at hand—

[22] *W.*, n. 22, note o.
[23] *W.*, 31, note u.
[24] *W.*, n. 29.

There was still wanting a being who could refer these gratifications of the senses to a sort of proper mind, or to his own consciousness and perception, and who, from the faculty of intellect, might decide upon the beauty resulting from all these harmonies, and also from beauties might perceive delights; from delights, grounded in a true origin, might form conclusions concerning goodness; and, lastly, from goodness might comprehend the nature of blessedness: there was wanting, I say, that son of the earth, or that mind under a human form, which from the paradise of earth might look into the paradise of heaven, and from this again into that of earth, and thus, from a kind of interior sight, could embrace and measure both together, and from the conjunction of both could be made sensible of essential pleasure to the full; consequently, who, from a kind of genuine fountain of gladness and of love, could venerate, and adore, above everything, the bestower and Creator of all things. There was no object, not even the smallest, from which some resemblance of deity did not shine forth, and which, in consequence, was not desirous to offer itself to the enjoyment of such a being as could return immortal thanks to that Deity for Himself and for everything.[25]

Then follows the creation of the first man as the last and crowning work of creation, which is also the teaching of the theological works.[26] The bulk of the first Part and also the second Part of the *Worship and Love of God* are very largely a description of the creation of the first man and woman, and how their minds were successively opened to the wonders by which they were surrounded. Of all this only a general account can here be given, especially as concerns the development of the mind, to understand which the doctrines of the brain, bloods and fibres should be correlated.

In "the most temperate region of the orb" there was a grove,—

A Paradise in a Paradise, or the delight and crown of every grove and garden of the earth; it was also the latest in its formation, and crowned this centre of the solar rays. In the midst of it again was a fruit tree, which bare a small egg, the most precious of all others, in which, as a jewel, nature concealed herself with her highest powers and stores, to become the initiaments of the most consummate body: the fruit tree was from hence called the TREE OF LIFE.[27]

[25] *W.*, n. 30.

[26] *Divine Love and Wisdom*, nos. 65, 171. *Apocalypse Explained*, n. 1207; *et passim*.

[27] *W.*, n. 32.

In the midst of this egg, by the "intercourse of spiritual essence with the supreme aura of nature," [28] the human form began to be developed, degree following degree, until it was fully formed for birth into the world.

"All things were now prepared; the parturient branch, according to the times of gestation, declining itself by degrees towards the ground, at length deposited its burden commodiously on the couch underneath." [29]

The first-born, when he had broken through "the bars and bands of his enclosure," "drew in with his nostrils and breast the air, which he saluted with a light kiss." [30]

In order to clearly understand much that follows it should be remembered that the first men were created into the order of their lives, not being so entirely helpless at birth as they are at this day. Thus the first-born was enabled to feed himself from the surrounding vegetables, and developed rapidly, all of which is most beautifully described.

In agreement with the teachings of the theological works, that the first men were like wild beasts, walking on all fours and afterwards raised upon their feet in the process of development, we are told that "the infant as yet crept, and differed nothing from the wild beasts in his manner of moving, which being observed by the soul with a mixture of concern and indignation, she used all her endeavours to lift him up on high, and to set him erect on his feet." [31] Elsewhere we are told that he was raised up from "that low life, or from his creeping state," [32] and set upon his feet, in order that the whole Garden of Paradise might be presented to his view.

The theological works clearly teach that the men of the Golden Age were born into the order of their lives and did many things naturally which men today must learn by education and training. Compare the doctrine with what is taught in the *Worship and Love of God,* of the state of the firstborn:

Brute animals, which are born into the obedience of their soul from the first moment of their nativity, have also power over their limbs

[28] *W.,* n. 33.
[29] *W.,* n. 38.
[30] *W., Ibid.*
[31] *W.,* n. 44.
[32] *W.,* n. 46. Compare nos. 53e and 89e in regard to the ignorance of what evil was and that at first there was no need of language.

and muscles, stand upon their feet and walk, and skillfully enter on the performance of functions of their nature, still more wonderful than what are above recounted; and from the same moment they enjoy in full vigour the external senses; but it is otherwise with the human race in their most tender infancy: the reason is, because we enjoy a certain proper mind, which is called intellectual and rational, from which, as from its fountain, the will proceeds: this our mind is what governs the muscles and sensories of the body; wherefore also the actions, which are determined by means of the muscles, belong to it, and are called voluntary, which are so far rational as they descend from the purer and more sublime intellect of that mind. This our mind, which, as was said, presides over the muscles and organs of sense, is not born together with the body, but is opened, grows, and is perfected, in process of time, by the beneficial aid of the senses; and this is the reason why we are born into such impotence of acting and feeling. It was altogether otherwise in our first-begotten, whose rational or intellectual mind was not to be instructed and perfected in a similar manner, or from the bodily senses, but from the soul itself, while the sensories of the body only administered and were subservient; for he was born into a state of the greatest integrity, and into perfections themselves; wherefore full power must of necessity have been given, from the first moment of life, to his soul, enabling it to operate upon the muscles and sensories of the body, without the mediation of this secondary mind and its will: but that the case is otherwise in his posterity, is a most evident sign of imperfection.[33]

## THE TWO WORLDS; THE SPIRITUAL SUN WITH ITS HEAT AND LIGHT AND THEIR NATURAL CORRESPONDENTS; THE DIVINE ATTRIBUTES.

From what will now be shown from the *Worship and Love of God* it may be seen how distinct was Swedenborg's understanding of the differences between the spiritual and natural worlds, each with its own sun, heat and light, and how the spiritual sun is present throughout the universe by means of its heat and light, and that thus the Divine Providence is in the leasts of all things and reigns universally. With this introduction the reader will be enabled to understand the meaning of the wonderful vision into the spiritual world, and the doctrines concerning it, as presented in the Third Part.

[33] *W.*, n. 43, note c. Compare nos. 52, note n; 53, note q; 63, note d; *et passim.*

In at least two places it is definitely taught that there is a "kingdom to be inhabited by souls," [34] and that "the world was created by the Supreme for the sake of heaven;" [35] and in addition, the existence of the two planes and their distinctions are clearly defined as follows:

> That there are two principles most distinct from each other, one natural, the other spiritual, is a conclusion which follows and is demonstrated by all the subsequent passages in this work; also that the natural principle derives its birth immediately from the sun of the world, but the spiritual from the fountain of life itself, or the supreme Deity. . . . [Natural] forms, or the atmospheres arising from them, as the active powers of nature, are all inanimate, as everything is which derives its birth from the sun, the fountain of natural things. . . . [Above this is the] SPIRITUAL [form], containing in it nothing but what is infinite, flowing from the irradiation of the sun of life itself, as the other forms flow from the irradiation of the sun of the world; and as this flows immediately from the Infinite, or from God Himself, who alone IS, therefore in itself it lives, and is that which animates the souls of living things for the uses of their life; not that it is an universal soul, but that it animates those things which were born and made for the reception of life; for every soul is a substance by itself, which is perpetually excited, like natural essences by their auras, to live its own life.[36]

How closely this agrees with the oft-repeated teaching of the theological works that there are two suns, one natural, the other spiritual, and that all things arising from the spiritual sun are living, while all things arising from the natural sun are dead!

Long before he wrote the *Worship and Love of God* Swedenborg taught in the *Economy* that there were two suns, the one natural, but the other spiritual; and a long series of numbers develops the doctrine. This same doctrine under various forms makes its appearance again and again in the *Worship and Love of God.* The spiritual sun is called "the sun of life," "the fountain of love," "the sun of intelligence and wisdom," heaven's "own sun," "the supreme fountain of life." [37] Elsewhere reference is made to the two suns and the two lights

[34] *W.*, n. 23.
[35] *W.*, n. 84.
[36] *W.*, n. 24, note q.
[37] *W.*, nos. 25, note r; 63; 64, note f; ***et alibi.***

and luminaries.[38] Besides this it is taught that natural light and heat correspond to spiritual light and heat, or to truth and good, and that as in the ray of natural light natural heat is enclosed, so within the spiritual rays of light, or truths, goods are contained; besides many other related teachings familiar to readers of the theological works. A number of the more remarkable passages will now be quoted:

. . . . these two lights and luminaries, together with their two heats, are so distinct from, and so unlike each other, that they mutually shun and put each other to flight, still they do not disagree, but are in accord and unite in a friendly manner with each other, since one is for the sake of the other.[39]

. . . it is evident, that natural things were made to serve spiritual, as an instrumental or organic cause; in like manner, that this whole universe, which is subject to the sun of the world, was created by the SUPREME FOUNTAIN OF LIFE to serve as a medium for arriving at ultimate ends.[40]

[From the Supreme Deity] "as from the only fountain and highest sun of wisdom, all truths flow down as rays into our understanding."[41]

[The nature of the Supreme is such that] "the rays of His light are so many truths, and the fires of His rays are so many goodnesses."[42]

Into our minds also two lights flow in, one which is called spiritual, from the Supreme and His Love; the other natural, from the sun of our world and its heat; these lights meet together in our minds, and from their meeting together they become as centres of the whole universe, that is, of heaven and of the world.[43]

Light and intelligence, heat and love, "exactly correspond to each other;" . . . "love or spiritual heat."[44]

He is in our inmost principles, and also in the highest, Himself and His Heaven being in the former and the latter; all inmost principles are full of His rays, and where His rays are, there is His sight from the highest or His throne, consequently His presence, for rays continue objects to the sight.[45]

For our soul represents the Supreme Mind from which the universe was created, since she also in like manner, like the goddess of her little world, or a vicarious deity, resides in supreme and inmost principles, and in her own sacred temple, from which she governs her little universe; to her also is granted a similar species of Omnipresence, of

[38] *W.*, n. 56, 64, 74.
[39] *W.*, n. 64.
[40] *W.*, n. 64, note f.
[41] *W.*, n. 2e.
[42] *W.*, n. 49.
[43] *W.*, n. 56.
[44] *W.*, n. 67.
[45] *W.*, n. 56.

Omniscience, and of Omnipotence, but within the limits of her own kingdom; nothing also has its life therein, except from her life; for she has constructed, and, as it were, built all things from her own fibres, as from rays derived from the fountain of her life; yet she has not done this herself, but our Supreme, with His Love, by means of her.[46]

After the argument has been presented that "there are two lights altogether distinct from each other and differing in their natures" the series is continued as follows:

. . . heaven borrows nothing from the light of the sun to increase its lustre, but only from its own Sun, whence it derives its all. And if the lights are distinct, so must also their effects be, for effects make one with their causes, and conjointly mingle together their several properties. Heavenly light does not give the faculty of seeing forms, such as the eye transmits, but such as are their uses and goodnesses; for these are the ends, for the sake of which those forms were created, which ends are not marked in the earth, but in heaven. The rays of that light, in like manner, are continuous and discrete suns, or continued streams of their fountain; and whereas we are rendered more intelligent and wise, in proportion as we suffer ourselves to be more enlightened by it, hence it follows that that light flows only from the Sun of intelligence and wisdom itself, or from our Supreme; also that all things, which thence derive their origins, in like manner as those which are derived from solar light, are His types and images, and worship Him as their Parent. From the solar rays we are also instructed, what is likewise contained in the rays of this latter sun, viz., that both light and heat are contained, but that the light is spiritual, whence comes intellectual sight, or the understanding of truth, and that the heat is spiritual, or that it is love, whence comes the sensation of good.[47]

In the *Angelic Idea of the Creation of the Universe by the Lord,* after the angels' idea of the creation has been given as the production of great circles or atmospheres, one after another and from another, throughout which the Lord is present by His spiritual heat and light, moving and governing the whole creation as a single continuous chain, the angels' idea of the Lord is given as follows:

From this continuity as a one they have their idea of the Lord, that He is the all in all things, that He is omnipotent, omnipresent and omniscient, that He is infinite and eternal; and also their idea of the

[46] *W.*, n. 70. [47] *W.*, n. 63.

order according to which the Lord, through His Divine love and Divine wisdom, disposes, provides and governs all things.

How wonderful was the preparation which enabled Swedenborg to have an understanding of these sublime truths! The evidence in the *Worship and Love of God* that he did understand them is too complete to leave room for doubt; especially is this true of the Third Part, but before proceeding to it some additional evidence will be presented to show what a true idea of the Divine Providence Swedenborg had at this time:

Providence is called universal, because it is in things most singular, everything universal being known, existing, and being denominated from presence and power in things singular, as what is general is known, exists, and is denominated from its parts and particulars. What is universal is the complex of all things singular, as what is general is the complex of all things particular; unless what is universal be in things singular and with things singular, or in least things as in greatest, it is not universal; wherefore if we take away from universal providence, providence in things most singular, or separate one from the other, we destroy the very essence of universality.[48]

[Those who are deceived by the affections of the animus are] "altogether ignorant that the universe, consisting of infinite universes, with all those little worlds and orbs of minds, stands under the auspices of one deity, or of our Supreme, and of His Love, and is constantly governed by His Providence. They assign indeed the government of the universe to some Supreme, but the care of individual things they know not how to allow to any deity, therefore they adjudge it in part to their own providence, which they call prudence, in part to fortune; not knowing that Divine Providence cannot be universal, unless it be in things most singular, and that from these latter things it alone derives the name of universal; or that what is universal derives its essence and actuality solely from the individual things from which it exists; wherefore when they affirm the one, and deny the other, they destroy both." [49]

### THE THIRD PART.

The whole of the *Worship and Love of God* has never as yet appeared in print, as we stated at the outset. Besides the reprints of the Latin text of Parts I and II of the *Worship and Love of God,* originally published by Swedenborg in 1745, and the various translations which have appeared, some otherwise

[48] *W.*, n. 26, note s. [49] *W.*, n. 77.

inaccessible portions of the work are contained in Volume VII. of the series of photolithographic facsimiles made by Dr. R. L. Tafel. In this volume are contained reproductions of Swedenborg's own printed copies of Parts I and II, and in addition all that is extant of Part III.

Throughout Part I, which is about four times as long as either Parts II or III, Swedenborg entered marginal notes, sometimes short, at other times of considerable length. These notes are sometimes of value in the interpretation of the text, and were probably made by Swedenborg to facilitate the preparation of an index.[50]

One might easily suppose that the *Worship and Love of God* was meant to close with the last number of Part II, but in this *"Third Part concerning the Married Life of the Firstborn Pair,"* there is given a description of a wonderful vision in which the first pair behold the spiritual sun and representations of the fates and destinies of the universe. The contents are truly amazing, and of the utmost importance to a true and comprehensive understanding of the author's career; they also constitute the climax of the work, the preparation for which was made in the two preceding Parts.

The first portion of the text of Part III, as reproduced in photolithograph, consists of carefully-corrected proofsheets; the remainder, of manuscript, written in a large legible hand, from which it may be deduced that Swedenborg at one time intended to publish it. This is further confirmed by two interesting fragments of what was evidently a first draft. There is also a fragment of a sketch of the whole of Part III, corresponding closely with a portion in the text proper.[51] In the

[50] *D.*, Vol. II., p. 854.

[51] Further information concerning the Codex containing Part III., and the photolithographic copy of it made by Dr. R. L. Tafel, is contained in the following quotation from *D.*, Vol. II., pp. 853-854:

"This Codex contains the materials of the unfinished third part of the work on 'The Worship and Love of God.' It exists from nos. 11 to 125 in proof-sheet (16 pages), with the exception of page 11, which is blank. Nos. 118 to 131 exist in manuscript, and from this the contents of the missing page 11 can be supplied. The work was evidently never finished by Swedenborg; for at the close of the Codex is a plan of the whole work, in which those parts which had been written out by him have been checked off. Swedenborg's printed copy of Part II., which

middle of a sentence in n. 131 (the Part begins with n. 111), the MS. comes to a close, and according to Dr. Tafel it was never finished.[52]

After a short introduction, describing the honeymoon of the first pair, there follows the description of the vision. Then, after the manner of the *Economy* and other previous works, but not in keeping with the style of Parts I and II, the subject-matter is taken up point by point and elaborately treated. Both the firstborn and his consort carry on the conversation, but chiefly the former, explaining what was meant by the heavenly phenomenon which they beheld. As usual, there are copious notes in elucidation of the universal laws referred to in the text.

There now follows a translation of part of the general description of the vision:

In the early morn, when Aurora sent forth on high the rays of the rising sun, like arrows tinged with gold, into the hemisphere of heaven, they both awoke at the same time from a most sweet sleep in the conjugial couch which they had shared, for a kind of heavenly lightning glanced over their eyes, driving away rest and drawing the attention of both away from each other and to itself. There appeared something in a middle region of heaven which was to display and signify the universe with its destinies and inmost certainties; this presented itself to the sight of both as in clear daylight. First, there shone forth a Centre of Dazzling Light, of such infinite brightness, that the solar flames, radiated from Aurora, retired into the shade, and the glowing torches of the constellations immediately disappeared. Thence also the eyes of both began to blink so that they were altogether compelled to close them with their veils, but nevertheless the

had been published by him in London, 1745, is likewise bound up in this Codex; but his printed copy of Part I. is no. 68 of the collection. Short abstracts of the contents are written on the margin of that volume probably for the purpose of compiling an Index.

"All these three parts, i. e., Part I., with its marginal notes, Part II., and Part III., which consists partly of proof-sheets, and partly of manuscript, have been Photo-lithographed as Vol. VII. of the Photo-lithographed MSS. of Swedenborg. Parts I. and II. which were printed in quarto in 1745, for the sake of uniformity, were reproduced in folio. Of Part III., nos. 111 to 119 were copied from the proof-sheets, and nos. 120 to 131 from the MS. The Photo-lithographed copy covers 114 pages in folio."

Further information on this and related subjects may be found in the last section of this paper.

[52] *D.*, Vol. II., pp. 854, 950.

splendor shone so clearly that it flashed through to the purest points of the fibres. This Centre so poured forth Its Light through the universe that its terminations or ends vanished from the sight, and then, because of the incomprehensibility, a blackish stupor was poured forth into the spheres of all the senses. SECONDLY, Round about this Most Bright and Spacious Centre there appeared to be produced a Border, purple from brilliancy, but flamy, glittering with a transparent beauty, tinged with a Tyrian hue, a circle of gems. This was flowing about into perpetual orbits, in number like the endless Meander. The gyres of the orbits went into perennial courses and revolved their ends from firsts to lasts and when they had revolved insinuated them again in firsts. The gyres were constant, but because they entered into and receded from each other, the sight following them was led into errors, although the revolutions of all flowed and reflowed most uniformly. This border and its meandering banks were crowned by most beautiful faces and forms of bodies the foreheads of which were covered by diadems, set with gems like little constellations. All the forms resembled the firstborn and his most beautiful companion and represented loves like them in the beautiful couch in which they reclined.[53]

The quotation just given constitutes a little more than one-third of the description of the whole vision, and it is this portion which Swedenborg fully developed, explaining what was represented by the Most Brilliant Light whose rays streamed forth to the ends of universe; what by the purplish, flamy border that appeared to surround the Central Light; and what by the intricate gyrations and appearances of the Border. In the remainder of the vision some highly interesting things are presented which will be considered after Swedenborg's own explanations of the first part of the vision have been given.

Thus runs the description of this marvellous vision which the parents of the future human race beheld on their wedding morning. Their first astonishment was succeeded by the desire to unravel the meaning of the representation.

Amazed by these sights they again contemplated each other, and each wished as it were to read from the face of the other what lay more deeply hidden within these things.[54]

Each "reasoned similarly and framed a series from firsts to lasts." [54] The youth, noticing this comprehension of the meaning of the vision, "touched her cheeks with the palm of

[53] *W.*, n. 112.

his hand and gently asked her to bring forth from the shrine of her mind what she knew to be the interpretation of this heavenly phenomenon."[54] But she "modestly replied that she considered things so deeply hidden in the arcana of heaven and involved in the progressive evolutions of so many events, as they appeared in the vision, to be of so high an import, that, as regarded them, she did not dare to open her mind, which ran over the surfaces of things so lightly and cursorily; but she wished, if he would only regard her desire favorably, to depend upon his statement in these and similar matters, for he had examined such subjects more thoroughly, because more slowly and maturely, and had explored them more sharply in their interior chains of connection."[55] She then proceeds at some length to present her view of the vision as a whole, introducing it by the declaration that what she knew she had perceived "by a certain favoring consent, which I received from thy face, which reveals the ideas of thy mind to me."[55] But how glad we should be that she determined to speak, for the result is a universal view of the whole universe and the reason of its creation. She says that heaven and the world and all things in them—

> —constitute a great series and an immense complex of means to a certain ultimate and most holy end, for the sake of which there are the creations of so many uses and hence of so many effects. . . . For this universe, which we behold, is only the complex of means and ends, tending and conspiring towards an only [End]. For the Supreme Mind, or the Architect of the things of the universe,—who sees most minute things, even those of the future, as present together in Himself and thus in His Own Clearest Light,—foresaw and provided Ends, before times and spaces arose, thus from eternity, which should continually flow forth from the First Itself to ultimates and from these flow back again to the First Itself; therefore He established and instituted a great orbit, or He founded the universe, heaven as well as the world, according to such a design that Ends foreseen and provided might exist in act and thus put on the reason of uses and the form of effects and so revolve in their gyres.[56]

She then continues the argument showing that "our minds, which are most finite and in shadows, by a gross view of things separated from their connection and by a vague regard of

[54] *W.*, n. 113. [55] *Ibid.*

means at the greatest distance from the end, and also by regarding a few things only,—may fall into error and their ideas be easily taken away." [56] Not so the Infinite—

—For the Infinite sees nothing in our finite things except the Infinite; for all the orbits which we speak of are only designs from His Ends as from centres, and, as was said, determinations to uses and the forms of uses and thus centres of centres arranged as it were into fluent circumferences. Hence is the consent and the harmony of all things; for the ultimate end of the First, or the first end of the ultimate end, rules and disposes the middle ends, and these, withersoever they turn, bear in their bosoms or faces, as in a mirror, the image of that only End.[57]

In this view the universe "consists of perpetually smaller and thus of least orbits, so chained together that they flow into each other and flow in such order into the great orbit that no accidents whatever occur." [57]

This view is further developed in a note as follows:

That the Supreme Mind, according to Considerations [*Intuitiones*] of Ends from eternity, established the universe, which was to be a complex of ends or means, we may contemplate in our own minds as it were in mirrors, or rather as in types. We also, before the origin and existence of means, regard and intend some end, for which, in order that it may exist in act, we seek means, or mediate ends, which shall all promote the first and relate to it, or as it were portend its image, for we as it were see the principal end joined with the mediate ends, which is the reason that we embrace the means with as great a love as the end itself. These means, taken together, constitute a certain world, in which all the mediate ends are called uses, and all uses existing in act are called effects; thence is our moral world. Such little worlds, which are a complex of means, every rational mind establishes, and whatsoever does not tend and conspire as a means to its first end it discharges from its little worlds, or rejects and proscribes as vile. Since our finite minds, wrapped in nothing but shades, design such things, what not the Infinite Mind in which there is no shade, but which sees most single things in the clearest day and to which Omniscience, as also Omnipotence, are adjoined that the results of ends may be provided. The life and essence of all minds consist in the intuition of ends, and at the same time in their disposition to some ultimate end, which, because it was also the first, reigns as it were alone in all and single means. From this very life the excellence of human minds should be judged, which, if they regard the love of self or a

[56] *W.*, n. 113. [57] *W.*, n. 113.

similar love as an end, will also attribute a kind of previdence and providence to themselves, so that they strive to appear as deities and deduce all the courses of ends from themselves and lead them to themselves; but of what quality their providence or prudence is, will be, God willing, disclosed in what follows.[58]

After the bride of the firstborn finishes her explanation and again entreats him to tell her what was meant by the representations in the vision, he makes a few general statements and then begins a particular explanation, as follows:

But let us examine the singulars in the series in which they appeared, and as we evolve them, let us determine the connection of the things which followed with those that preceded, and thus behold the order; and finally, from the End of ends, the wonderful progression and correspondence of the intermediate causes; for only in the ultimate which crowns the work is seen the relation of the things which preceded and the provided agreement of apparent disagreements shines forth. Thus are dissipated obscurities, which have arisen from an unconnected series of perceptions and hence a prejudged Order of the things of the universe, as of a machine composed of parts, some of which are not yet prepared or seen.[59]

The first point taken up is the Centre of dazzling light whose Brightness put to flight the flames of Aurora and the glowing torches of the constellations. He says:—

In order that we might by the images of nature behold heavenly forms, the Supreme Life of Minds wished to represent Itself by a Dazzling Light, which poured itself forth from a spacious centre, as if from a Sun, into the ends of the universe. Thence Heaven took its origin and thence the world, Heaven mediating. That Light, or Life, shone forth from the Sun of Life of all things, or of the Intelligence, Wisdom, Justice and Glory of all things: for there are as many determining forms of truth, whence is intelligence, as there are rays flashing forth from that Light or Life; there are as many Goodnesses [*Bonitates*], whence is Wisdom, as there are Sacred Torches within the rays. The Order thence flowing is called Justice, whence are the Laws by which the whole world is ruled.[60]

The number concludes with the statement that the Glory of that Infinite Life is of such splendor that all other things appear as shadows in its presence, which was represented by the disappearance of the flames of Aurora and the glowing torches

[58] *W.*, n. 133, note a.
[59] *W.*, n. 116.
[60] *W.*, n. 117.

of the constellations. In the following number the reason is given why their eyes began to blink so that they were obliged to cover them with their lids or veils, viz., because no one can bear to behold the Infinite Itself for—

It would be as if someone dared to look into the most Holy Shrine of that Wisdom, or enter the court of Its Justice, and there search into and unfold the Laws decreed from eternity; he would be immediately punished for the temerity of such daring; for such a vertigo would seize the sight of his mind, and shade would blind it, as would befall the sight of the eye of him who gazed steadily at the sun, the pupil of his eye not being protected; on account of this danger arose our blinking and the veiling of our eyes by their lids.[61]

But even then "the splendor shone so brightly that it flashed through to the inmost points of the fibres," because –

The Divine Life signified by this Light is the only Life of living things; they are only rays of the Light of this Sun, or streams of the Life of this fountain, which It as it were modifies in various ways. Thus it grants its light to the sight of our minds, that is, life, which is Intelligence and Wisdom, [and so our life] consists in the cognition of truth and the perception of good. [The Supreme Life and Light] penetrates our lights (*lumina*), with whatsoever veils they may be covered, for whatever of light (*lux*) there is in the lights (*lumina*) of the universe, or whatever of life there is in souls, minds or animi, and in the senses and actions of their body, is derived from that alone; but where it is without the mediating Light, Life and Justice of Its Only-begotten, there is not light but shade, not life but death, for there is not Justice but the punishments of Justice on account of injustice. Our soul, which does not live its life itself, but from that Only Life, is in all the beginnings of the fibres of its body, not only as the reason of their existence, but also as giving them birth; for organic or compounded things are nothing but principles or simple things, determined into various forms according to uses. This also was the reason that the Splendor of that Light, the veil not hindering, shone so brightly that is flashed through to the purest points of the fibres. Thence it also appears that nothing can be so skilfully covered over in outmosts, and that nothing can be so artfully concealed in inmosts, which the Omniscient will not see through most clearly in Himself or in His Light.[62]

Then follows the explanation of the sentence that "This Centre so poured forth Its Light Through the universe that Its terminations or ends vanished from the sight." It did so because—

[61] *W.*, n. 118. [62] *W.*, n. 119.

In this Light, or Life, there is nothing but the Infinite. Our sight or understanding, which is circumscribed by most finite boundaries, either falls into delirium, or into a swoon, or perishes as a sailor in a great ocean, if it dares to behold and still more if it dares to examine the infinities of the Infinite.[63]

The number continues the argument, showing that because the Divine Light is Infinite its terminations vanish from sight. A notable definition is contained in the words that the sight of the human mind is "the understanding of truth and good." [63]

There now follows the particular treatment of what was signified by the great Limbus or Border which appeared around the Central Light or Solar Space. Wonderful definitions are given, from which it is evident that by this Border was meant nothing less than the Mediate Life, Wisdom and Love, the Son of God from Eternity, or the Divine Existere, which makes it possible for men to be conjoined with the Divine. We cannot but conclude, after weighing the evidence, that Swedenborg here meant to teach that no one cometh to the Father except by the Son. But hear the evidence itself:

The Splendor of that Light, or the Glory of that Life, which poured itself forth to the ends of the universe, that is, through ages of ages, from eternity to eternity,—could not be communicated to our minds, and still less to the other or lower powers of our lives, without manifest danger of death. For what else would result from a communion of the Infinite with finite beings, or of the Most Holy and Just, with us who live from the dust and in it, but that we would be accused of impurity by Its Holiness, condemned by Justice and sentenced to death; therefore, He begot His Image, or Son, from Eternity, through Whom or through Whose Life He might inflow mediately into the faculties of the life of our body; Who, because He was born a mediation and Only Love of the Supreme, is His Life, which is signified by the Flamy Border purple from brilliancy, which appeared round about this most bright and spacious Centre. This is the Life which is properly called Heavenly and which excites the understanding and will of our minds. For Life is twofold, one is heavenly and the other is natural, but both are derived from the only Life of the Supreme. Natural life without the mediation of the heavenly, is, as was just said, not life but spiritual death in its image; for there is no Love, no Holiness and no Justice which mediates, from which division between the Divine Life and the natural life of man perpetual combats arise.[64]

[63] *W.*, n. 120.

[64] *W.*, n. 121.

The few sentences which follow the above quotation are the climax of the *Worship and Love of God,* and present the truth which the author had most in view in writing the book.

That Heavenly Life, represented by the Flamy Border, not only pours Divine Light into our minds, which live it, and thus transforms them into intelligences, but it also pours in the Flame, purple from brilliancy, from which the intelligences also become wisdoms. For it is the Divine Life, from which is the intelligence of truth, represented by the brilliant Light, and joined to Love, effigied by the purple Flame, which causes intelligence to become wise, namely, that it not only perceives from truth what good is, but also from good what truth is, and thus from truths and at the same time from goods, he worships and loves the Best, that is, the Supreme; wherefore without an interceding or mediating Life of that Flame or Love, the Best or Supreme could not at all be approached because not conjoined by Love, for APPROACH BY WORSHIP IS SUCH AS IS CONJUNCTION BY LOVE: this Intelligence, together with Wisdom, it was, which glittered with a transparent beauty, tinged with a Tyrian hue, a circle of gems.[65]

This doctrine, prefaced by a description of the operations of the human mind, is further developed in a long note, as follows:

To understand and be wise are two altogether distinct things, for we may understand and still not be wise; but one leads us to the other, namely, science to the cognition of Truth (*Veri*), and truth (*Veritas*) to the cognition of Good, and it is the good which is sought for. But in order that we may be wise, it is necessary, not only that we should know and thus understand what truth and good are, but that we should also be affected with the love of them. Therefore, in the degree that there is good or the truly useful in the objects of the intuition of our minds, which objects we embrace and consequently pursue as an end, in that degree we are wise. This we may clearly see from the operations of our minds, or from the series of progression of the operations, which is this: *First,* by way of the senses, which is called the posterior way, we either immediately seize that which will be a help or instrumental cause leading to the cognition of things, or we take it from the memory, into which the objects of the senses are brought under the appearance of material ideas. *Second,* we take that which is perceived by our inmost sense, or laid up in the memory, and as it were introduce it into our intuitive or rational mind and there turn it about and rationally discuss it, although we should view it only from above and thus revolve our intellectual ideas above it; this is called thought.

[65] *W.,* n. 122.

*Third,* these ideas, or thought, frames its reasons into a series and thus forms a certain analytic equation, or a chain entwined by reasons, which is called judgment or the formation of judgments from the objects of thought. *Fourth,* under these, as in calculations, we draw a line and from them we argue as in logic. But these, which have hitherto been turned about in the sphere of the mind, are mere inquiries of truths, and by means of these inquiries, or their series, inquiries of goods. But in themselves they are bare cognitions and pertain to the first faculty of the mind or the understanding, that is, to intelligence. But here the hinge as it were turns, for this first scene of the operations of the mind is immediately succeeded by another, namely, *Fifth,* to choose from the calculations and conclusions of judgment that which will regard the end or use, is called the election of good, and *Sixth,* this is finally brought to a certain principle of actions called the will, within which are all those things which preceded and were chosen. For, as all the essentials of motion are within the conatus, so all the essentials of action are within the will, so that the will is a certain living conatus to which those essentials are brought according to the series bequeathed by the understanding. *Seventh,* concerning this wisdom may now be predicated, for in the degree that the good or the truly useful is within the thoughts, judgments, conclusions and selections, that is, in the will, in which they are all together, and in the degree that this is produced in act, in that degree we are said to be wise. . . For what are truths without an ultimate regard for good! Or what is the understanding of the mind or intelligence, unless to know how to choose the Good, to prefer the Better, and finally, to will the Best. To this nature herself impels our minds, that is ourselves, for everyone desires and pursues happiness; neither is happiness given except in Good, consequently neither the greatest happiness except in the Best; nor does Good flow except from the Best and indeed by mediation. Wherefore to know much and also to understand, and not to be wise, is to rave in the midst of the sciences, or like Tantalus to be surrounded by water, but never to drink a drop; for it is Wisdom which completes and crowns intelligence and effects that intelligence may understand. But what is the Best? All truths promptly disclose it with one consent, namely, that the Best is that which is the first Origin of all goods and truths, or from which, as from an inexhaustible and perennial Fountain, all goods flow as streams; or, more simply, it is the First, for this is also the Supreme or Highest, whence it follows, that it is God, or that it is in God. . . . From all these things it follows as a conclusion that the highest of all cognitions is to know how to approach God, in Whom is the Best, and also the Greatest Happiness. But, to *approach* in spiritual things is to be *conjoined,* while to recede is to be disjoined. Conjunction, however, is only given by Love, for Love is union itself or spiritual connection, for by its conjunction even disjoined things are connected. Love also is the soul of all happinesses, for we only enjoy that which we

love. Love is also the very Life of our minds, for if you remove the loves, our minds grow torpid and as it were die, but such as is the love such is their life. Thence now it follows that as the highest of all intelligence is to know how to approach God, in Whom is the Best, and also the Greatest Happiness, so the highest of all wisdom is *to be conjoined to God by love;* this now is that which was said, *that such is approach by worship as is conjunction by love.*[66]

Let us now pause a moment and reflect upon this mass of evidence. In the preceding section it was shown that Swedenborg teaches in numerous places that there are two worlds, and that in the higher and interior world there is a Spiritual Sun, whose rays appear as truths, within which there are goods. This is confirmed again and again in Part III, with a unique addition, viz., it is actually represented in the narrative as having been seen by the first pair, because, as is said, "the Supreme Life of minds wished to represent Itself by a Dazzling Light, which poured itself forth from a spacious centre, as if from a Sun, into the ends of the universe." It is furthermore taught that "thence Heaven took its origin and thence the world, Heaven mediating." The same truth is taught in the Writings. Truths are described as "rays flashing forth from that Light or Life" and "there are as many Goodnesses, whence is wisdom, as there are Sacred Torches within the rays." The most sublime truths are here presented arrayed in the poetical garb of representations and sometimes as true correspondences. How beautiful the idea that the flames of Aurora and the torches of the constellations vanished on the appearance of the Spiritual Sun! How true and clearly stated is the definition that our life "consists in the cognition of truth and the perception of good!" Were it not too prolix, example after example might be adduced showing that the terminology and the distinctions observed are often identical with those in the Writings. What light, too, is contained in the statement that "organic or compounded things are nothing but principles or simple things determined into various forms according to uses!" There is a clearness and weight in the original which cannot be fully carried over into English. In that universal statement are contained the laws of the *Principia* which unlock-

[66] *W.*, n. 122, note b.

ed for Swedenborg the secrets of the universe and the human form.

The sublimity of the representation of the Divine Communication, represented by the Flamy Border, has been already adverted to, and it is inspiring to think that such a doctrine was the culmination of Swedenborg's preparation, involving the truth that the End of Creation was the Conjunction of the Creator with the human race. Such was Swedenborg's thought at this time; it was the inspiration which led him to write the *Worship and Love of God,* and it is now clear why he so entitled the work, because the whole argument is made to show that "the highest of all cognitions is to know how to approach God," but since "to approach in spiritual things is to be conjoined" and conjunction "is only given by Love, for Love is union itself or spiritual connection," therefore "the highest of all wisdom is to be conjoined to God by Love," "wherefore without an interceding or mediating Life of that Flame or Love, the Best or Supreme could not at all be approached because not conjoined by Love, for APPROACH BY WORSHIP IS SUCH AS IS CONJUNCTION BY LOVE." In the manuscript itself this climax is twice underscored, showing that it was meant to be printed in small capitals; it is also repeated in the note in italics. Readers of the Writings will recognize the familiar truth that the real quality of external worship is determined by the state of internal worship, which with the celestial is love to the Lord and with the spiritual charity to the neighbor.

But to return to the thread of the narrative. In the numbers following those which have been quoted from,—and especially in a long note,—the doctrine of forms and the brain are considered, subjects of such an extensive and intricate nature that they cannot be advantageously treated here. Such meandering gyres were also seen in the Flaming Border and the author thus states the general law:

If we diligently investigate, with an interior keenness of vision, our minds and their modes of turning, we will see meanderings of a similar fluxion, such as in this most beautiful Border, which represents in an effigy the Heavenly Life, and the Heaven of our Love, or the Only Begotten of the Supreme. For their substantial form is such, by whose

variations, or mutations of state, are formed and produced those rational series, by means of which ends are defined as uses, and these determined into acts; for human minds are little effigies of the great Heaven, that is, so formed that they both can and should live the Heavenly Life; for when they are led by the Heavenly Life, they perceive truths, which are the objects of their sight; and it is the spiritual Flame, or Love, which so leads them, for Love alone excites the lives of minds to action. . . . In general it must be maintained, that the Supreme has transcribed into us, as into small types, the ideas (*ideas*) as well of His Heaven as of the world, in order that the gyres of His Ends and Means, from firsts to lasts and from lasts to firsts, might go forth and return through us.[67]

The importance of the general subject is dwelt upon in the following language:—

⊢From our very selves, if we will only distinctly examine our faculties, we may clearly see of what quality the universe is, as well Heaven as the world. These things, although they are the marrow and essence of the Sciences, are nevertheless more deeply hidden in shade than anything else, and nothing is less cared for than to know our spiritual lives, which is to be attributed to no other cause than that we do not live the Heavenly Life, whence is the light of intelligence, but a natural life, or only in the senses, the body and the world, which life involves all things in mere shades.[68]

After the first pair had seen the Flamy and Purple Border and its wonderful gyrations, they noticed another Border forming around it similar to a fiery river. By the first Border was represented the Heavenly Life and by the second one the Natural Life. While it remained in order and in connection with Heavenly Life, its color remained the same; but presently it began to change, first into a brazen and afterwards into an iron color, by which was represented the separation of natural from spiritual life, and the origin of what was merely natural not spiritual. There also appeared a great congeries of eggs on the surface of those Borders, and, wonderful to relate, they began to be animated by rivulets of influx from the Borders. Those which communicated with the inner or Heavenly Border assumed a human form, while those which partook only of the outer or Natural Border appeared like beasts. The human forms looked within and the beastly forms without, and finally

[67] *W.*, n. 124.

[68] *W.*, n. 124, note e.

they separated from each other. The next scene represented a great pyramid or cone on which there appeared an immense human body, which was swept up into Heaven, no doubt representing the formation of the Grand Man out of the human societies which,—it is said in Part III itself,—were represented by the great body. This is the substance of the evidence and thus closes this remarkable vision.

GENERAL REVIEW.

Probably no work written by Swedenborg has been so much misunderstood as the *Worship and Love of God.* Besides the usual cause, that of carelessness in reading the book, there are several others. Among them may be mentioned the ignorance and lack of comprehension of the works written prior to it, especially the *Principia;* misconceptions concerning the style, such as taking certain statements literally, when they are defined in the work itself to be representative; and, on the other hand, supposing some things to be allegorical which the author meant as scientific facts. And finally, particulars have been viewed by themselves, out of the general series and apart from the universal laws which they were meant to illustrate.

It is just as necessary to understand the *Principia* if we are to enter into an interior examination of the *natural* world, and the human body, as it is to comprehend the subjects treated of in the *Divine Love and Wisdom* if we are to really understand the *spiritual* world and the Grand Man.

The *style* of the work under review is that of a prose-poem, presenting synthetically all of Swedenborg's previous scientific and philosophical studies in a representative and ofttime correspondential epitome. In poetry the past and the future often appear as present, and in a seed is seen, as if before the eyes, all things which will grow out of it. The *Worship and Love of God* is full of examples of this. In the new-born earth is seen its future triple kingdom, mineral, vegetable and animal. The work itself presents the law as follows:

This is the common case in generations which arise by a successive series, that in themselves they represent things prior, and contain things posterior, as present; for everything is produced to be an image of the

**form of its genetrix, and includes in it the general destinies of the future offspring as if they were present.[69]**

A good example is seen in the Third Part, where the fates and destinies of the *future* human race are pictured in the liveliest fashion.

It has been supposed that parts of the early teachings of the *Worship and Love of God,* culminating in the birth of man in a matrix on a tree, were written allegorically, when nevertheless all the tenor of Swedenborg's previous writings, the doctrine of Discrete Degrees, and even the authority of the Writings, leave no room for doubt that it was meant as a scientific fact. It is a constant law that no new form is created on any plane without the planes prior to it successively contributing to its formation; there is no skipping of degrees. If objections are found to man's having been created by means of a vegetable matrix, precisely similar objections will have to be met in regard to the first creation of vegetables by seeds formed in the mineral kingdom; the difference is merely one of degree. But the creation of seeds in the mineral kingdom is plainly taught in the Writings; besides, there is the law that sustenance is from the same plane as creation.[70] The case was well summed up by the President of the Swedenborg Scientific Association, when he said that the doctrine of the *Worship and Love of God* was at once most rational and beautiful. The doctrine involves Swedenborg's whole philosophy, for the point itself is the seed of its universe; all effects are potentially contained in causes and the causes similarly in the ends.

The wisdoms and intelligences have been taken to be real spiritual beings, although Swedenborg distinctly states that—

By his discoursing with his intelligences is to be understood that he discoursed with himself, that is, that he thought; for thought is a certain species of discourse with man's self; for since the operations of our mind are real activities, or changes of state by variations of form, it follows that they also constitute a species of interior speech; etc., etc.[71]

Elsewhere, in connection with the introduction of celestial

[69] *W.,* n. 19, note l.
[70] *Divine Love and Wisdom,* nos. 310-312.
[71] *W.,* n. 53, note p.

wisdoms and intelligences "under the appearance of infants," it is taught that—

> The discourses of all celestial intelligences are mere representations by images, which actually exist before them, and are so contrived that hence every truth may plainly and clearly shine forth before our eyes; he who understands these representations understands also the discourse of heavenly beings, or heavenly discourse, etc.[72]

In another place it is said that sportive infants "represented goodnesses under the appearance of loves." [73]

Criticism has a true and important place; it is as necessary for us to discriminate in regard to what we admit into the mind, as, on the bodily plane, care should be exercised in the choice of food. But there is a limit, a golden mean; the substance of things should be examined rather than the form; there should be a constant effort to get at the spirit of things; for "the letter killeth, but the spirit giveth life." The firstborn was thoroughly imbued with this truth, for he said "I do not look at leaves, but at fruits and their seeds, nor do I relish shells, but kernels; for their goodness and usefulness delight me more than their most ornamented forms." [74]

An application of this method will teach us to avoid the formation of hasty conclusions, and reading ideas into statements which they were never meant to express; for in this way the mind arrives at those principles which, Swedenborg was told, would enable him to soar whithersoever he willed.[75] He himself says when treating of the method which will dispel obscurity:

> But the cause of this obscurity is merely an inversion of our state, by virtue whereof things prior must be unfolded and viewed from things posterior, and thus finally wisdom be attained: for in things posterior things prior lie concealed, as causes and principles in effects, consequently they are concealed as in a shade: but that one thing may come forth from another, and we may view it distinctly, it is necessary that we view it from what is prior, or from light itself, whether inspired or revealed, and thus by that order which is treated of in this article. . . . But what is the nature of that order, and what the nature of influx according to that order, must be drawn from the doctrines of order

[72] *W.*, n. 57, note u.
[73] *W.*, n. 59.
[74] *W.*, n. 53.
[75] *Animal Kingdom*, Part IV., p. 82.

and of degrees, also from the doctrines of influxes, which ought to be cultivated.[76]

By virtue of this disposition Swedenborg arrived at his wonderful laws, culminating in such views as, that the universe is a great progressive orbit, ruled by the Divine Providence in the lesser orbits, which all lead back to the Divine Itself; that in the Divine are Ends, in the spiritual world causes and in the natural world effects, represented in the vision by the Solar Centre and the two great Borders around it; and finally, that the Supreme is truly worshiped in the degree that man is conjoined to Him by loving Him.

In conclusion, we think that we can in no better way throw light on the work under review than by unveiling some of the stars in the brilliant constellations of the *Principia, De Infinito* and the *Economy.*

The reason why man in a state of integrity was made a complete philosopher, was, that he might better know how to venerate the Deity —the Origin of all things,—that Being who is all in all. For without the utmost devotion to the Supreme Being, no one can be a complete and truly learned philosopher. True philosophy and contempt of the Deity are two opposites, (etc.) [77]

Primevally his [man's] delights wholly terminated in the love of God, —a love which exhausts and replenishes all sense of delight. . . . Supreme veneration and supreme love of the Deity could not exist without the supreme worship of Him. What we venerate and love, this we worship; for the utmost degree of veneration conjoined with love must needs be active and operative, and must extend to the will and actions.[78]

[By an undoubting faith man] "is sensible in love, or delight resulting from love, of a peculiar connexion with the infinite. But where he doubts, he does not acknowledge, and the divine is not in him. All divine worship proceeds from this fountain of faith and love. Of worship, however, we must treat in another place, the subject being one of immense extent and difficulty: enough for the present to know that it is given in revelation. Thus the true divinity in man, who is the ultimate effect in which the divine end dwells, is no other than an acknowledgment of the existence and infinity of God, and a sense of delight in the love of God. . . . Therefore the acknowledgment of God, with faith for its ground, is the foundation for all divine worship."[79]

[76] *W.*, n. 66, note h.
[77] *Principia,* Part I., Chap. I., p. 35.
[78] *Ibid.*, p. 44.
[79] *On the Infinite,* etc., pp. 71-2.

The means by which man can prepare himself to communicate with the Divine Life and Love are, understanding and wisdom. "Thus, in human subjects, there is a more excellent and greater life, according to the degree of intellect that is brought into play in the regard of the more universal ends," [80] for, "between love and love there is not a closer nor a sweeter bond than wisdom." [81]

HISTORICAL AND BIBLIOGRAPHICAL SKETCH.

From the quotations just made it appears that even in 1734 the subjects of the worship, veneration and love of God were occupying Swedenborg's mind to no small extent, and from the work on the *Infinite, etc.,* we learn that it was the author's intention to treat of those subjects in a future work. In the present section such other statements by Swedenborg as bear on the *Worship and Love of God* will be briefly considered. In addition some account of the bibliography of the work will be given and a brief collation will be made of such historical and critical matter as is at hand. The arrangement will be chronological as far as possible.

In that remarkable document, Swedenborg's *Book of Dreams,* are contained a number of statements which show what was Swedenborg's state of mind just before and during the time when he wrote the *Worship and Love of God.* These statements illustrate n. 2951 of the *Spiritual Diary,* where Swedenborg says that for some years he was *informed by dreams* concerning what he was writing.

On October 7th he writes:—

I was further informed respecting my book upon the *Worship and Love of God,* which was said to be a divine Book (*man sade at den wore en Liber divinus de Dei cultu et amore*). I believe it was to contain also something about spirits; my book on the Infinite (*de Infinito*) I thought treated on something similar; but I did not receive an answer to this.[82]

On October 10th he writes:—

[80] *Economy of the Animal Kingdom,* Part. II., n. 236.
[81] *W.,* n. 55.
[82] *D.,* Vol. II., pp. 209-10, n. 182.

Afterwards there was signified to be by a representation . . . that on the previous day I was engaged with my work [*Worship and Love of God*], which is entirely different from the other [*Animal Kingdom*], and [proceeds from] an entirely different love; and [I was in doubt] whether the former work should prevail (*om den skulle rada*), and whether it should not rather be regarded as mere talk and as a plaything only, when compared with the other. Upon awakening I fully made up my mind to abandon the former work.[83]

Dr. R. L. Tafel, in another place,[84] in quoting the statement in the *Book of Dreams* for October 9-10, ceases to quote at the above point, which gives a different impression from what is given if what immediately follows be added:

..and I should have done so, if it had not afterwards seemed to me in my sleep, that I had been sent to a certain place with a letter. I did not find the way; but my sister Hedwig saw the letter, and said it was intended for Ulrica Adlersten, who had it appeared longed for me. I went there, and saw also Schonstrom. Afterwards I had continually a sensation as if they went up to the brain and down again.—By this I was confirmed to go on with my work. May God grant that this be not against His good pleasure, since as soon as I break off my sleep I at once come into the effort to abandon it; besides God Himself helped me to arrive at this resolution. To God alone be praise and honour!

Dr. R. L. Tafel interpreted the whole quotation differently at different times. First, in the translation in the *Documents,* he states in the notes that the work to be abandoned was Part III of the *Regnum Animale* and that the other work alluded to was the *Worship and Love of God.* In *Words for the New Church* he reverses the order by inserting in brackets the titles of the works as he thought they were related. According to the latter interpretation, which we think is the true one, the "other" work is the *Regnum Animale* and the work which he meant to abandon is the *Worship and Love of God.* For this reason we think that the quotation should be made in full, because thus it is seen that in spite of the temporary thought of abandonment Swedenborg "was confirmed to go on" with his work, i. e., the *Worship and Love of God,* and *not* the *Regnum Animale.*

Further information is contained in the succeeding paragraph, where Swedenborg says:—

[83] *D.,* Vol. II., pp. 212-13, n. 191.
[84] *Words for the New Church,* Vol. I., p. 528.

A child fell over my foot, hurt himself and screamed; I helped him to get up, and said, Why do you race so?—This no doubt meant that I was too much in a hurry with that [i. e., the second work, or the *Worship and Love of God*].[85]

On October 26-27 Swedenborg writes:

It was foretold to me that the twenty-seventh of October would come again; when I undertook the *Worship and Love of God* (*Sades mig forr at d 27 oct: skulle komma igen. da jag tog mig fore cultum et amorem Dei*).[86]

The translation given is according to the *Documents,* but in *Words for the New Church* the translation is given, "it was foretold to him that the twenty-seventh of October would come again when he *would enter upon 'The Worship and Love of God.'*"[87] From the words *"would enter upon,"* which we have italicized, the casual reader might infer that on the *succeeding* twenty-seventh of October the work was to be begun, which is contrary to fact. What then does the passage mean? We know very well that Swedenborg had all along been engaged on Part III of the *Animal Kingdom,* which he published in 1745, and that in the early days of October, 1744, he was at least thinking about the *Worship and Love of God,* as may be seen from the references already made. Did he then only think and plan about the work during the days of October previous to the twenty-seventh, and on that day begin the actual composition? More light will be thrown on the question by the following quotation, also written on October 26-27. After rooms and apartments have been treated of, concluding with the words, "Afterwards I went into my own little chamber, which was also shining," the explanation is given as follows:

By this is signified the whole of that work upon which I am now entering in God's name; in front, before me, is the part on the *Worship of God,* at the sides that treating on *The Love* [*of God*]. There is also signified thereby that I must not take of the articles manufactured by others, as those were contained in the saloon which I had rented; but that I must use my own. My chamber, which was adjoining, signified this other work; and the room at the side signified the one which

[85] So interpreted by Dr. R. L. Tafel in a note, *D.,* Vol. II., p. 213.
[86] *D.,* Vol. II., p. 217, n. 202.
[87] *Words for the New Church,* Vol. I., p. 529.

did not belong to me. May God lead me in the right way! Christ said that I must not undertake anything without Him.

I mounted a fine black horse. There were two of us. The horse was fiery; it first went out of the way, but afterwards turned round.—This signifies my undertaking, which as yet appears dark to me, but at last will move in the right track.[88]

In the following paragraph his "new work" is mentioned.

The part on the *Love of God,* which lay at the sides, perhaps refers to the third Section of Part I; the part concerning which we are at a loss, is that on the *Worship of God,* which lay in front, unless indeed it refers to Part III. Perhaps the solution of the whole problem is that Swedenborg on the days previous to October 27th was at work on a sketch and first draft of the proposed work, and that on the day itself he started in anew; for he says that the undertaking "as yet appears dark" to him, but at last will "move in the right track." This view is confirmed by the facts that in several other cases Swedenborg made sketches and drafts of works to be written, and that fragments of what was evidently a first draft of Part III have actually been found.

In 1745 Swedenborg published Parts I and II of the *Worship and Love of God* at London in Latin. The Parts were published separately, each with its own title page and pagination. The title pages in full read as follows:—

*Pars Prima de Cultu et Amore Dei; ubi agitur de Telluris Ortu, Paradiso et Vivario, tum de Primogeniti seu Adami Nativitate, Infantia, & Amore, ab Eman. Swedenborg. Londini. MDCCXLV.* [*4to, pp. 120.*]

*Pars Secunda de Cultu et Amore Dei; ubi agitur de Conjugio Primogeniti seu Adami, et inibi de Anima, Mente Intellectuali, Statu Integritatis & Imagine Dei. Ab Eman. Swedenborg. Londini: Apud Joh. Nourse & Richard Manby. MDCCXLV.* [*4to, pp. 24.*]

The translation of the title pages will be given presently when we come to discuss the first English edition.

In 1745, the same year in which Swedenborg published the *De Cultu, etc.,* he began his study of the Sacred Scriptures.

[88] *D.,* Vol. II., pp. 217-18, nos. 203-4.

These studies are collected in the *Adversaria.* The first of the series, a treatise on the first three chapters of *Genesis,* called *The History of Creation as related by Moses,* thus refers to the *Worship and Love of God*:—

> It has been treated of the earth's origin, paradise, the nursery of the living, and the birth of Adam in Part I of my treatise on the *Worship and Love of God,* but according to the leadership of the understanding or the thread of reason; but since human intelligence should not be trusted to by any means unless inspired by God it is of importance to truth that those things which are taught in the little work mentioned be compared with the things revealed in Sacred Scripture and here with the history of Creation revealed by God to Moses, and thus to examine how they agree; for whatever does not altogether agree with things revealed must be declared altogether false, or the delirium of our rational mind;[89] with this end in view I felt it necessary to present in advance a brief commentary on the first chapters of *Genesis.*
>
> When now I carefully compared them [i. e., the commentary and the *Worship and Love of God*], I was astonished at the agreement.[90]

He then proceeds to institute comparisons between the solar chaos, planets, atmospheres, and the creation of vegetables, animals and man, as treated of in the two works. Elsewhere he recurs to the creation of man in a vegetable matrix and to the formation out of a rib, of the first woman, evidently referring to the *Worship and Love of God.*[91] In two other places,[92] when treating of man's primal integrity and the degrees of the mind, he refers the reader to the treatment of those subjects given in Part II of the *Worship and Love of God.*

Dr. Beyer, in 1776, in a letter to C. F. Nordenskold concerning the theological works, after adverting to Swedenborg's investigations of natural things, refers to the *Worship and Love of God* as follows:

> For this reason the work *De Cultu et Amore Dei* is not of importance in respect to theological doctrine; but in respect to natural truths it contains many beautiful and profound thoughts. On the subject of

[89] At this point of the passage, Dr. R. L. Tafel, in quoting it in the Chronological Account, breaks off abruptly. The force, however, is lost unless the following sentences be also considered. Cf. *D.*, Vol. II., p. 950.

[90] *Adversaria,* Part I., Vol. I., p. 7.

[91] *Ibid.,* pp. 13, 10.

[92] *Ibid.,* p. 34, n. 10 and pp. 97-8, n. 131.

God, and love and wisdom, on the Son, the person of Adam, the sources of life, and imputation, he expressed himself quite differently after he had received instruction from the Lord in the above manner; wherefore the above work is never cited in the other works.[93]

In 1814 a letter was sent by a Swedish gentleman living in London to G. Bilberg, the secretary of the Society *Pro Fide et Charitate,* which existed in Sweden from 1795 till about 1835,—asking for information regarding the *Worship and Love of God.* This letter, as inserted by Dr. R. L. Tafel in the *Documents,* reads as follows:—

Mr. Tulk requests the Society in Stockholm to communicate to him either directly, or through the writer of the letter, their ideas about the first work which Swedenborg wrote after his revelation in 1743, entitled, *De Cultu et Amore Dei,* published in 1745. He believes, as does also the Rev. Mr. Clowes, who is the most enlightened man in England in Swedenborg's doctrine, and who has translated all his writings into English, that it contains a genuine description of the creation, especially as Dr. Beyer frequently quotes it in his 'Index,' of which Swedenborg no doubt was aware. Mr. Tulk's own words on the subject are as follows: "Dr. Beyer has included this work in his references in his *'Index Initialis.'* Now we have reason to think that his Index was made with the knowledge and approbation of Swedenborg, and if so, Emanuel Swedenborg must have known of the insertion of the *De Cultu,* &c., in the work by Beyer. We wish therefore that you yourself, or some kind friend, would inquire of the friends in Stockholm, and discover if possible Dr. Beyer's sentiments upon it, which he may possibly have left in writing or otherwise transmitted orally, as the decisive opinion of Swedenborg upon it. The *De Cultu,* &c., was published in 1745, two years after his revelations, and before he published the first volume of the *Arcana,* which was in 1749." . . . If you or any one else can furnish some light on this subject, it would be most welcome to the Messrs. Tulk and the friends in London, who are particularly engaged upon that work at present.[94]

The *Documents* add:—

The following answer of G. Bilberg to Mr. Tulk was found among the papers: "Dr. E—m has told me that you wish to know our opinion respecting the truth of the work *De Cultu et Amore Dei.* I am able to tell you on the authority of Christian Johansen, who interrogated Swedenborg himself on this subject, that he obtained from him the following answer: 'It was certainly founded on truth, but that some-

[93] *D.,* Vol. II., p. 427.

[94] *D.,* Vol. II., pp. 709-710.

what of egotism had introduced itself into it, as he had made a playful use in it of the Latin language, on account of his having been ridiculed for the simplicity of his Latin style in later years. For this reason he did not regard it as *equal* to his other works.'"

This evidence is interesting as showing the state of thought of early New Churchmen in regard to the *Worship and Love of God,* but as concerns the validity of the statement attributed to Swedenborg we agree—

..that with all deference to so respectable an authority we feel a strong inclination to reject the whole statement, as one bearing intrinsic evidence of having no foundation in fact, or else of having been vastly changed from its original form. Swedenborg was not the man, least of all at this time of life, to be driven by the ridicule of others into the adoption of a new style of writing. The style itself is indeed elegant and ornate, such as would entitle the work to be placed by the side of any of our greatest modern epics, including the *Commedia* and the *Paradise Lost,* but it is, at the same time, the one alone adequate and perfectly adapted to the matter in hand. Moreover, Swedenborg was not, so far as we are aware, in the habit of passing judgment on his own writings, asserting that one was not the equal of others, etc.[95]

In 1790 a translation of the *De Cultu, etc.,* was begun in the *Magazine of Knowledge,* Vols. I and II. It was not completed.

In 1791 Robert Hindmarsh reprinted Part II in quarto, pp. 26. Whether he also reprinted Part I we have thus far been unable to ascertain.

In 1812 another translation was begun in the *Halcyon Luminary.* It was not completed.

In 1816 a Swedish translation, entitled *Om Dyrkandet och Karleken till Gud* (Stockholm, Deleen), was begun, but "Only 48 pages were printed. The translation is the work of the Rev. A. A. Afzelius, a famous Swedish prelate, poet and hymnologist, member of the Society *'Pro Fide et Charitate.'*"[96]

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[95] Rev. Frank Sewall in *The New-Church Review,* Chicago, 1882-4, p. 180, in *A Drama of Creation.* This notable contribution to the study of the *Worship and Love* of God was republished, with slight alterations, in *New Metaphysics* by Frank Sewall, James Speirs, 36 Bloombury Street, London, 1888, pp. 208. The above quotation will be found on pp. 188-9.

[96] *Annals of the New Church,* by Rev. C. Th. Odhner, Vol. I., p. 253.

In 1816[97] appeared the translation into English of Parts I and II, 8vo, pp. 291. The title pages read as follows:—

*Part the First, on the Worship and Love of God; treating of the Birth of the Earth, of Paradise, and of Living Creatures, also of the Nativity, the Infancy, and the Love of the First-Begotten, or Adam. Translated from the original Latin of Emanuel Swedenborg. Manchester: Printed by F. Davis, 5, Hanging-Ditch. Sold by Messrs. Clarke, in the Market-Place, Manchester; and in London, by E. Hudson, Cross-street, Hatton Garden; T. Goyder, 8 Charles-street, Westminster; and may be had of all other Booksellers. 1816.*

*Part the Second, concerning The Worship and Love of God; treating of the Marriage of the First-Begotten, or Adam, and, in connection with it, of the Soul, the Intellectual Mind, the State of Integrity, and the Image of God, by Emanuel Swedenborg.*

As an "Advertisement" to Part II, the following short paragraph, which has been retained in all subsequent editions of the translation, was inserted by the translator:—

> The Treatise which follows is evidently a continuation of the foregoing one, though published by the Author as a distinct work. It is therefore thought proper to give it the distinct Title in the translation which the Author has given it in the original.

In 1828 the first edition of the English translation was followed by a second; 8vo, pp. 210. The title pages are not changed from those of the first edition, but it was published at London; "*Printed and Published by J. S. Hodson, 15, Cross street, Hatton Garden; and sold by T. Goyder, Dartmouth street, Westminster; W. Simpkin and R. Marshall, Stationers' Hall Court, Ludgate street; and by W. and W. Clarke, Manchester. 1828.*"

In 1832, at Boston: "*Published by John Allen, No. 11, School street,*" appeared the "First American from [the] Second London Edition." No change was made in the title pages, except that the words "Part the First" were omitted in the first one. The volume is in 12mo, pp. 213.

In 1864 followed the "Second American Edition." It ap-

[97] *Not* in 1801, as stated in *D.*, Vol. II., p. 209 *et alibi.*

peared at Boston: "*Published by T. H. Carter & Company, No. 21 Bromfield street. 1864.*" 12mo, pp. 240.

In 1870 appeared the photolithographic facsimile of all of the text of the *De Cultu, etc.,* that is known to be in existence. For fuller information see the section of this paper devoted to *The Third Part.*

In 1883 the Latin text of Parts I and II was republished at London by Thomas Murray Gorman,—*Ad Fidem Editionis Principis 1745 Londini Excusæ denuo edidit Tho. Murray Gorman, M. A., e Coll. Hert. Oxon. Londini: Apud Kegan Paul, Trench, et Soc. MDCCCLXXXIII.* The title page of Part II is dated MDCCCLXXXII, probably due to an oversight. The reader may also see a reprint at the end of Part II of the advertisement contained in the *editio princeps* of the *De Cultu, etc., Regnum Animale,* and *Oeconomia Regni Animalis,* showing at what a very low price the works were sold. The volume is in 12mo, pp. 223.

In 1885 there appeared at London: "*Kegan Paul, Trench, and Co. 1885,*" a slightly revised edition of the English Edition of 1828; 12mo, pp. 253. The editor was Thomas Murray Gorman. The words *et Vivario,* rendered "and of Living Creatures" in the title page of Part I of previous editions, are now rendered "and the Abode of Living Creatures." In all editions of the work in English an alphabetical Glossary of mythological terms, inserted in the first English edition of 1816, has been retained, and in addition the "Translator's Preface" was retained in all the translations, except the two issued at Boston in 1832 and 1864. In the edition of 1885 the editor, Thomas Murray Gorman, added an "Address to the Reader," which shows him to have been an earnest student of his author, although in his eagerness to establish his position he sometimes employs far-fetched arguments and comes to erroneous conclusions. But we are in entire agreement with his general position as defined in the following passage, which we think is one of the strongest and most lucid statements in regard to Swedenborg's preparation that has ever been penned:—

Swedenborg's preparation for his unique mission is a subject to which the mass of his admirers have given too little attention. By some

it has been disregarded, and even despised. By others it has been considered in the most superficial manner. By none has it ever been seriously and methodically examined. And yet what a preparation that was! Apart from any opinion that may be formed respecting the validity of his claim or his teachings, it will be found, after due examination, that this orderly and thorough preparation for a special work has no parallel in the history of the race. The stupendous course of study which he pursued made his mind a clear mirror for reflecting the most important and firmly established results of the best experience and thought of all past ages until his own day. As a master of the highest and noblest human cognitions, seen in clear rational light, and without fundamental fallacy, he stands altogether alone. It was not, therefore, to be wondered at that many and singular mistakes respecting his teachings should be made alike by friend and foe.[98]

In the same Address the writer refers to the translator of the first edition into English and the quality of his work as follows:

Considering the character of its contents, the marvel is that this work should so soon have found a translator. In due course the task was undertaken, in the order of Divine Providence, by one who was in entire sympathy with the author, and who performed his labour of love in a spirit of genuine affection and deep reverence for the sacred and mysterious subject of which it treats. Thus the strange little book, with its twofold title, was not doomed to utter neglect and oblivion.

In the year 1816, nearly half a century after the decease of its heaven-illumined Author, an anonymous translation appeared from the pen, as is now well known, of the Reverend John Clowes, who was for upwards of sixty years rector of St. John's Church, Manchester. A second edition, still without a name, was issued in the year 1828.[99]

Passing over the references to the *Worship and Love of God* contained in the biographies of Swedenborg, which have either been very brief or have not entered deeply into the spirit of the work, we would direct the attention of the reader to the excellent contribution to an understanding and appreciation of the work made by the Rev. Frank Sewall, entitled *A Drama of Creation*, which we have referred to and quoted above.[100] Besides the general view of the whole book afforded by the account of the work, which is supplemented by liberal quotations, the author analyzes the *style* of the *Worship and Love of God*

[98] Pp. xxv.-xxvi.
[99] Pp. x.-xi.
[100] Cf. note 95.

in a most appreciative manner, and discusses the position of the work in the whole series of Swedenborg's writings.

In conclusion, we would give it as our conviction, formed after a prolonged study and analysis of the *Worship and Love of God,* that when the whole sweep of macrocosmic and microcosmic investigations, conducted by Swedenborg from 1710 to 1745, shall have been more thoroughly studied, the book will acquire a force and meaning which can be little more than dreamed of today. May the time soon arrive when New Church men and women will see the glorious light contained in Swedenborg's philosophical system!

ALFRED H. STROH.

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NOTE: The foregoing article suggests convincingly the need for a translation of the work, *Worship and Love of God,* into English. It is therefore with great pleasure that we announce that the writer of this Analysis, Mr. Alfred H. Stroh, has prepared a new translation of the *entire* work, including the Third Part, which now exists only in the Photolithographic MSS. Edition.

The Swedenborg Scientific Association desires to publish this work without delay, and will do so, if sufficient funds are subscribed to warrant the outlay. Every reader is therefore invited to assist in the publication of a new and *complete* edition of the *Worship and Love of God,* faithfully translated, printed in large type on good paper, and attractively bound. If the work is published as a result of this call, anyone contributing not less than $1.50 will be entitled to one copy; larger amounts will be apportioned accordingly.

As the possibility of publishing this work at an early date will depend mainly on the co-operation of the New Church Public, we sincerely hope that this will be both general, and liberal, as well as prompt.

Those desiring to contribute will please communicate with the Treasurer of the Association, Mr. Carl. Hj. Asplundh, Huntingdon Valley, Pa.

## SWEDENBORG ON THE APPEARANCE AND DISAPPEARANCE OF NEW STARS.

THE story of the new star suddenly appearing in Perseus in February, 1901, is a late item of the continuous Wonder-Word of Creation, the rumor of which has aroused wide-spread interest even among our busily engrossed public. Not that the birth of a new star, or the rapid obscuration of one newly gleaming out, are rare occurrences in the shining annals of the sky. "Astronomy," Swedenborg says, "is richly furnished with phenomena of this kind;" and he quotes from David Gregory a list of new stars noted from the age of Hipparchus down to 1702.[1] Since which time a number of additional *novæ* have appeared. Again, in the *Worship and Love of God,* where Swedenborg is speaking of a formation of the primitive planetary- or magnetic ether in the immediate vicinage of the active solar area,—he mentions that such an occurrence is not infrequent in the heavens; and instances the occasional appearance of new stars at first shining with a "ruddy-gold effulgence" (*admodum rutile effulgentia*);[2] and presently obscured; to be restored again to splendor. The "obscuration" mentioned being incident to this formation of a dense mass of a primitive planetary-matter about every active solar area at a relatively early epoch after its first establishment; and the sudden restoration of splendor being due to the too great expansion and final breaking up of this encompassing planetary mass under the continued action of the centrifugal force of the whirling motion imparted to it by the axillary rotation of the new star or sun,—assisted by a certain pressure exerted upon it interiorly by the fiery and expansive energy of the central active-area inclosed. Such sudden disruption is followed by an outward-gyre of the planetary masses along a widening helix path as they lose

[1] *Principia,* Swedenborg. Pars III. Paragraphus iv. (7).
[2] *De Cultu et Amore Dei.* Caput I; section I, 9 (d).

the force of the first centrifugal impetus and are caught up by the large flow of that vast "vortex-ring" of the solar sphere (of magnetic ether) which forms an immense, permanent magnetic field about solar centers, revolving with their motion, and accompanying them as they move along their orbit. Borne by the large flow of this rotary solar-sphere, condensing as they go, and trailing their substance about them, the primordial planetary masses pass outward from the sun in easy gyres toward the place of their final equilibrium and orbit.[3] Thus, according to Swedenborg, there may arise "new heavens," and in the heavens new solar-vortices and systems with their planets; and in this manner, arise new creations in endless succession, at the nod of the Divine power (*si annuat numen*).[4] Elsewhere, as quoted, he instances by name and date several such actual occurrences. So manifestly abundant and present is the continual creative and formative power in the starry deep, and so wonderful its operation, that Swedenborg compares this sending forth of a new system, as it were a new star, to nothing less, for wonder and worth of interest, than the creation and first formation of a new human being,[5] all the miracles of which are directly attributable to the Divine Providence.[6]

This notable new star of February, 1901, the *Nova Persei,* is even not the first star appearing in the constellation Perseus, but the second. It is, however, the first *nova* of which a series of photographs has been obtained, permitting a comparison both of the phases of its rapidly changing and often alternating spectra, and of the successive positions of the several bright condensation centers occurring in the surrounding nebula; from which comparisons a certain trend of cosmic event was manifest, not only in the tremendous operations going on in the active area itself, and its immediate vicinage, but also as making rationally certain the existence of some structural and motive connection between the condensation-masses in the swirl of

[3] *Principia.* Pars III. Paragraphus i. (1-11), III., IV. (1-7), V., XI. (1-7).

[4] *Principia.* Pars III. Paragraphus II.

[5] *Regnum Animale,* Swedenborg. Pars VI. Section II: 41. Inductio.

[6] *Economy Animal Kingdom,* Swedenborg. Part I., 296.
*The Divine Wisdom* (*A. Ex.*), Swedenborg: II.; [2], [4].

those far-off and swiftly fading nebulous-wisps and the new-born star, whereby they referred themselves to the active area of the *nova* as to the center of their own immense gyre.

That such an event should have aroused the interested speculation of the whole scientific world was inevitable. On both sides of the Atlantic, astronomers, physicists and chemists have been eagerly engaged on the various aspects of phenomena presented. The possibilities and inferences most pressingly suggested involve not only the direct astronomical interpretation of the phenomena and their bearing on questions of solar epoch *sub judice,* but they touch upon matters of solar physics in such wise as to renew questions as to the origin and maintenance of the great active areas constituting what we call solar centers; and reach to fundamental considerations as to the origin and mode of origin of ponderable "matter" as we know it, from the substance of the imponderable ether. For the impondering ether, being regarded as the sole primordial and all-present or pervading medium, presumably furnishes to matter itself its substratum or substance.

The facts concerning the new star in Perseus, briefly, are as follows:

It appeared February, 1901. In four days its brightness increased from invisibility until it became the brightest star in the northern sky,[7] and Vogel, speaking for the Potsdam observations, says that the brightness of the new star, which according to Pickering was certainly not of the eleventh magnitude on February 19, increased so rapidly that at 10 h. on February 23 it had attained magnitude 0.24; a rapid increase which he says,—"permits us to assume enormous disturbances in the atmosphere of the star." [8] The color of the star, as first seen in the Yerkes Observatory, University of Chicago, February 24, was, G. E. Hale reports,—*Yellow with a reddish cast.*[9]

The Nova then diminished in brightness, irregularly, till on

[7] *Science,* Nov. 29, 1901, page 860: "The New Star in Perseus."

[8] *Astro-Physical Journal,* April, 1901, H. C. Vogel: "On the Spectrum of *Nova Persei.*"

[9] *Astro-Physical Journal,* March 1901; Geo. E. Hale; Bulletin 16, Yerkes Observatory.

June 1st it was on the limit of visibility. The spectroscopic returns at this time run as follows:

Potsdam Observations (Vogel. *Astro. J.*, April, 1901), report, February 23, at time of the maximum brightness of the new star, that the photographs of its spectrum, "which with a simple ocular spectroscope was very brilliant," were found to be almost without detail, to the no small astonishment of the observers.

There were no emission lines whatever; and of absorption lines only a few of hydrogen, diffuse and weak; and a couple of calcium lines. February 26th—Emission lines begin to appear; and increasing structural detail in spectra of later photographic plates.

The Lick Observatory reports February 24th,—Hydrogen band bright and broad on a strong continuous spectrum. February 25th,—Hydrogen; probably sodium.

The Yerkes Observatory, February 24th, inferred (by comparison spectra) hydrogen, sodium, titanium. On February 28th,—Hydrogen lines, bright and broad; dark lines superposed, probably due to reversal caused by absorption of outer layer at lower temperature. Bright sodium line: Helium line, Calcium lines, magnesium; chief nebular line seems to be present.

From Potsdam, Vogel reports that between February 26th and March 4th there was a change in the spectrum; absorption lines distinct, and accompanied by broad emission lines; and comments: "In a word, the spectrum has become that typical of a new star, and shows on a large scale the changes which Wilsing's observations have shown to occur in the spectra of metals and of hydrogen under high pressure."

Lockyer's observations (Pro. Roy Soc., December 2, 1901) note April lines as broad and hazy,—afterwards narrower and clean edged; the early prominent lines of hydrogen as afterwards weakened; and enhanced lines of iron, magnesium, etc.—conspicuous on early plates—as disappearing later; while Yerkes Observatory (April. *Astro. J.*) reports,—observations between February 25th and April 10th show falling off in intensity in less refrangible region; continuous spectrum much

fainter; and early lines diminished in intensity. This is confirmed in general by Bulletin 8, Lick Observatory.

For March, 1901, to May 3, Pickering reports changeable spectrum, varying daily,—but in general fluctuating between two types seemingly connected with marked changes in the brightness of the star itself. One type presented a strong, continuous spectrum, with hydrogen lines normal, and coincided with those periods when the star brightened greatly. The other presented a weak continuous spectrum; lateral extension hydrogen lines; strengthening of various bright lines;—and coincided with periods of minimum light. For June 25th he says: "An examination of the Draper photographs of the spectra of *Nova Persei*, No. 2, . . . shows that, like other *Novæ*, it has been gradually changing into a gaseous nebula;" although comparison with a nebular spectrum seems to show its chief nebular line to be relatively weak (*Astro. J.*, July, 1901). The Lick Observatory, Bulletin, No. 8, reports the spectrum of July 9th as that of a nebula. The particular form characterizing a telescopic star or sun is, however, still retained, as is noted in *Science*, November 29th, 1901. The Nova at that date being "according to the spectroscope a nebula, although retaining to the telescope the point-like form of an ordinary star."

A scheduled summary of reports would run:—*February, 1901*, a new star appeared in Perseus, the light of which increased within four days from invisibility to the greatest brilliancy of all among the many shining star-suns of the Northern sky. It was then of a ruddy gold color, and at that early maximum of overflowing radiance presented the peculiarity that although its spectrum was very brilliant it was almost without structure, having but one or two absorption lines. Then follows the rapid appearance of emission lines; the presence of both emission and reversal lines of hydrogen and the lighter metals. The early haziness of spectrum lines passed into greater definition and detail; and a final fading of the hydrogen and metallic lines on the spectrum coincided with the growing notable indication of the characteristic nebular spectrum; the lines of which have been partly identified, as some of them coinciding with certain hydrogen lines, and some either coinciding

with or closely approximating certain lines characteristic of nitrogen; the lines of a nebular spectrum not appearing until some time subsequent to the appearance of the star and its early radiant maximum, and then only establishing itself gradually. Thus the nebula is manifestly an effect and not a cause in the production of a new star.

This gradual change in the character of its spectrum occurred in Nova Persei without the new star losing to the telescope the point-like form characteristic of an ordinary star-sun.

It is of profoundest interest to study the series of phenomena by light of that series of event which Swedenborg says follows fast on the creation of any active solar area in that universally-extending volume of First Aura or primal ether, which he says is coextensive with the Universe itself—is *in plenum* throughout the Universe and is antecedent to suns and solar systems.

First of all, he says, there is the expanse of this most pure, serene, primal ether, the First Aura,—quintessential, wonderful, extending throughout the created universe.[10] Then the Lord begins,—establishes,—creates and maintains, somewhere within the universally extending expanse of the Primal Aura, a new solar-center or active solar area, which from the beginning is both kept in those fine alternating expansions and contractions which send out their message of light and power into the surrounding deeps of the Universe; and in a rotary motion which begins to urge and solicit and draw into a like vortico-rotary-gyre that portion of the primal Aura which touches and presses it about. Next there begins,—by instrumentality of the centrifugal force exerted by adjacent layers of Primal Ether already "in gyre," upon layers further away not yet drawn into motion,—a certain compression of the ether-substance itself; at a little distance from the immediate active area.

The first result of this compression is the formation of a layer composed largely of those particular composite-substantial-entities which are termed by Swedenborg, "Third Finites" (or finites of the third grade);[11] which third finites are learned from

[10] *Economy Animal Kingdom,* Part I., 638; Part II., 166; 312; 339. *Regnum Animale,* IV. [VI.]. *Lesser Principia,* 62-3.

[11] *Principia,* Part I.; Chap. VIII., 3-4.

the connections of their various series of ultimate uses to be the particular grade of primitives-of-ponderable-substance which are basic to hydrogen and the metals. These, excited by the surrounding motion and communicated heat agitations, would at once begin to send out the various vibrations characterizing them, upon the ether, giving rise to their own peculiar spectrum lines.

After the formation of a volume of these is well begun, the volume of magnetic ether can begin to be moulded; not before. For the molecules of units of the magnetic or secondary ether which constitute the proper solar sphere, are vortico-corpuscular forms, the envelope of which is framed of a mass of third finites; the center being far less dense, and occupied only by a very little active area occupied alone by a few flying finites of a finer grade. But so soon as third-finites exist, the volume of magnetic ether begins to be formed about the solar center, and flung outward; flying with tremendous outrush, and gyring as it goes, toward the confines of the sun's active power. Immediately after the formation of the substance of this solar sphere of secondary or magnetic ether,—by means of a compression produced by the greater centrifugal effort and pressure of layers nearer the active area,—and therefore in faster rotation, upon layers further remote,—there begins to be moulded a mass of that distinct Fourth-grade of primeval or primitive matter, called Fourth Finites or substantials. These Fourth Finites constitute the mass of the primeval substance of the planets; and from their connection and relation in other series of use, we know enter into the substance of electricity (Swedenborg's Third Ether), give its characteristic element to the "lightning fire" of Jove, and are part of the constitution of all nitrogen compounds, entering also the carbons.

It is to be noted that this *compression* mentioned as the means of moulding new grades of primeval "substantial entities" to serve among other uses as the primitives of new families of ultimate chemical compound,—does not at all result in the production of a mere general agglutinated and indeterminate mass, as might be inferred. The sort of thing which does result, Swedenborg says, and that necessary substantial and motor basis

in the material acted upon by the compression which he postulates as a cause of such result, may perhaps be presented justly, although in briefest compass, by an illustration drawn from the Kinetic Theory of Gases; with modifications.

This Theory, as Meyer gives it, is as follows:—"In the gaseous state [the individual particles of matter] are entirely detached from each other; each particle moves around with great rapidity and rushes forward in a straight line until it comes in contact with another particle or some other impediment, from which it rebounds like an elastic ball and continues its movement in a new direction." From the premise in this theory, that the native path of these particles is a straight line, it follows that if a volume of them were confined within finite limits and always colliding with each other, yet they are supposed never to form—and never have any tendency to form—composites and associations among themselves,—but at the end of ages the volume is assumed to be the same volume of unassociated individual colliding particles it was at first.

This assumption, according to Swedenborg, will be true *if* the orbit of the particles *is* a straight line, or is an unclosed orbit. But if the orbit of the particles be a *closed* one, of finite diameter relatively to the boundaries of the space, *it will not be true.* For in case the orbit of the particles be a closed orbit—a ring say,—at the end of indefinite time we would find within our vessel a number of rings, formed by the association of numbers of particles arranging themselves thus, at length, through many collisions, and these rings would exist as substantial entities which would possess something of the known characteristics of matter; i. e.—coherence, permanence, resistance, occupation of space within their boundaries. And this result will, according to Swedenborg, inevitably follow if the path of the supposed particles be a *closed orbit.*

Now according to Swedenborg, the primitive substantial entities first created of all, are to be conceived of about as are the particles or molecules in a volume of gas according to the kinetic theory; *with this alteration of the theory,* that they move, not in a straight line, but in a closed orbit. The closed orbit which he postulates for them is not a simple ring. It might

be roughly figured by the line the moon traces yearly in its progress round the sun by a circle of some thirteen loops. Or, a length of a dozen loops of spring wire uncoiled carefully from a spool and the ends brought around to meet give a fair idea of it. This closed orbit is supposed, in the case of the primitives of substance, to be of indefinitely small diameter. Now if substantive entities, possessing inherent kinetic energy and running in such a closed orbit, be brought together in a given finite space in sufficient abundance to be perpetually in free collision with each other, at the end of indefinite time great numbers of them will be found to have aggregated and associated themselves together in such a manner that they have formed a number of new substantial entities of the exact shape or configuration of their orbit; and the new compound-entities will possess a measure of coherence, resistance, permanence. In addition, if the closed orbit be of the postulated form, it can be seen that in the secondary-entities just spoken of, each given block of the substance composing it, will be tumbling or running around the entire ring, and thus the center of gravity of that block must be running around it also. This would result in "inciting" a certain rotary motion in the whole mass. And of the two motions would come a spring and conatus of the whole—under favorable conditions—to run into or describe a certain definite orbit of its own.

From which it would follow that these secondary kinetic entities if brought together under favorable conditions would, by means of collisions, at length arrange themselves by like process into like—but larger-aggregate—unities; with like, but less, kinetic energy,—manifested by an effort toward movement in like, but larger, orbits.

And these, Swedenborg says, are the actual, fundamental postulates of such result in nature: primitive substantial-entities, with intrinsic kinetic energy, moving in closed orbits, and in sufficient abundance to collide perpetually within the given space.

In *Nova Persei,* during the period extending from a time shortly after the first appearance of the new star to the establishment of its nebulous spectrum, there were coincidently pres-

ent in its spectra pairs of bright and dark lines, or the emission and reversal lines respectively characteristic of a substance in a state relatively active or "fiery" and in one relatively quiescent or "cool;" lines which were probably produced, therefore, by "layers" respectively near to or removed from the star itself. In addition, there occurred a shifting or separation of the adjacent bright-and-dark lines in such fashion as implied that the layers from which they were respectively derived were in tremendous motion,—a motion which, interpreted by Doppler's principle, would indicate that the distance between the respective layers producing the bright and dark lines was rapidly increasing. As this feature of the spectrum of *Nova Persei* is characteristic of the spectra of *novæ* in general, the discussion of the questions involved is of wider interest, because of wider applicability.

In the *Astro-Physical Journal* for May, 1901, Pickering, in confirming the explosion hypothesis of the origin of *novæ* as against the collision, from phenomena presented by Nova Persei, adverts to the general grounds for the former hypothesis in a short article, page 277, from which we quote:

> It was pointed out in *Astronomy and Astro-Physics*, 13, 201, that all the phenomena connected with the spectrum of a *Nova* could be readily explained if we supposed the appearance to be caused by an outburst of hot gases, which cooled as they receded from the star. The approaching gases being comparatively cool on the side turned toward us would present a spectrum of dark lines. The receding gases being hot on the side toward us would give a bright line spectrum. Since the direction of the velocity of the gases on the further side of the star in the line of sight was the reverse of the nearer gases, the latter could not mask the bright lines, and we should accordingly have a superposed spectrum of bright and dark lines as shown.

Later, after a comparison of photographs of different dates made it certain the faint surrounding nebula regarded the *Nova* as its center, about which it was revolving in an expanding or helix spiral,—Pickering sums the situation: "A luminous mass of gas is at the present time found to be receding from the *Nova* in all directions with an enormous velocity;" adding that it now seems certain that the velocities found in the nebula surrounding the *Nova* are very much higher than even the veloc-

ities that were at first calculated from the separation of the bright and dark lines. "This is a result," he says, "which could probably only be obtained from a continuously acting force." (*Astro J.*, December, 1901.)

On the other hand, Vogel, in considering this general question as to *Novæ* in the *Astro-Physical Journal* for April, 1901, says: "The relative motion of the two bodies, deduced from the separation of the centers of the adjacent dark and bright lines, led, however, to velocities so great as to be quite improbable." And he follows with most interesting applications of Wilsing's theory, to otherwise account for the large displacements of the lines. In the same number also may be found an article by Michelson, *On Doppler's Principle,* discussing the arbitrary application of a principle, based on sound (in which the source of the waves and the condition of the medium of propagation are within our reach), to the displacement of lines in spectra of celestial bodies; and suggesting several reasons for holding conclusions based alone upon such arbitrary application, tentatively only, not as dogmatic assumptions. In particular, he suggests two quite presumable cases in which interpretations of displacements of line in the spectra of celestial bodies, based on the Doppler principle as applied to sound, would certainly not hold good, i. e., in case the medium carrying on the waves of light be not at rest as a whole or in relation to us; and in case the medium through which they travel does not possess unchanged properties, as to density, etc.

The subject is one worth consideration from the point of view of certain cosmic-facts laid down by Swedenborg which may serve us as stepping-stones of approach toward it. For as Swedenborg gives some definite data, and outlines certain laws as to the series of substances and motor agencies concerned in the rise and progress of a new solar system in the universe, even until it is shaped complete,—active solar area, accompanying magnetic field, and planets, ready to offer themselves as fertile ovaries, co-operative, full of power, to the initiament of vegetable life,—what he says on the subject must stand as a general law covering all particular instances;—a law so wide of range, so sound and fundamental to the whole topic, that thought must reckon with it as a premise in all consideration of

the phenomena in given instances, if its conclusions are to run even fairly true to the trend of the actual developing facts, and attain that measure of certainty apprehendable by finite minds, which Plato would term "true opinion."

Now according to Swedenborg there is a tremendous centrifugally-directed force and pressure existent at and about every solar center or active solar area; and this from two causes. *First,*—the centrifugal push and endeavor of that irresistible rotatory motion in which the solar centre itself is, and into which it carries also its entire connected sphere. *Second,*—the whole force of those undulatory periodic *pressures* of light perpetually communicated by the active solar area to the surrounding ether-sphere; the entire sum of which is of course a centrifugally-directed push and pressure, since it radiates outward from that center in straight lines,[12] and thus acts upon any body only upon the side which faces the sun. For, according to Swedenborg's express statement, light, which is an undulatory motion of the ether,[13] the communicating center of which, in each solar system, is the active solar area central to the same,[14] remains as an actual undulatory motion only while still quite near that central area. For at a little distance from that center, Swedenborg says, the actual undulations become converted into a certain "undulatory pressure," [15] not again to pass into actual undulatory motion until it comes in touch with the tellurian spheres and ponderable matter of the earths.[16] The means by which this conservative transformation of the actual undulatory motions of light, as they exist about that active center, into this "undulatory pressure," are two: *First,* the close contact of those vortico-spherical corpuscles constituting the mass of the magnetic ether sphere itself; and, *second,* the reaction, everywhere exerted, by that "etheron," that cosmic "protyle"—(The Primal Ether or First Aura of Swedenborg,—the same which he says in its volume is commensurate with the uni-

[12] *Principia,* Part III., Chap. V., 20. *Lesser Principia,* 118-130.
[13] *Economy Animal Kingdom,* Part I., 170; Part II., 260, 293.
[14] *Economy Animal Kingdom,* Part I., 170, 299-306.
[15] *Lesser Principia,* 120, 124-5, 130.
[16] *Lesser Principia,* 126.

verse) [17]—which fills all the interspaces between the individual corpuscles of the magnetic ether sphere, as well as defines and bounds about all the endlessly many solar spheres themselves, and swings them in its vaster flow.[18] The whole force of the elastic reaction or repressure of this Aura,—as it comes in from the surrounding flowing deeps of the universe, is everywhere within the periphery of a solar sphere *centripetally* directed, and convergent in upon the solar center, and everywhere by its efficient reaction prevents the energy of the communicated-motion of the active solar center from being degraded or "dissipated," and conserves it to those proper ends and uses for which it was imparted. These ends and uses are two: The first use is one we partly understand, experiment and thought having in some sort apprehended its fact,—i. e., the motor energies communicated to the tellurian spheres and ponderable matters of the earths. Knowledge of that *Second* use, however, so far as I am aware, we receive from Swedenborg's statements alone. This use,—one operated throughout the area of the magnetic ether, during that period while it remains as a periodic "undulatory pressure" alone,—being not inconsiderable to the magnetic ether itself; for by it the magnetic ether corpuscles (molecules, units) are perpetually stimulated and forced to a certain intra-corpuscular periodic motion,—within their own boundaries alternately condensing and expanding again, as the alternate expansions and contractions of the acting solar area communicate to the substance of its vast surrounding sphere these traveling waves of alternate pressure and release. And some such perpetually-communicated, intra-corpuscular animation, or alternate expansion or contraction, is necessary—Swedenborg states—in the case of all ethers, to the maintenance of the integrity of their corpuscular or molecular form, and the spring, intrinsic motile energy or *vis motiva* characteristic of their primitive substantial entities.[19] For solar systems themselves

[17] *Economy Animal Kingdom*, Part II., 312, 339.

[18] *Economy Animal Kingdom*, Part I., 604, 635-9.

[19] "Wherever in the world, or in the earth's Kingdoms, there are substances endowed with active power and force, and therefore intended for performing certain functions and generating certain effects, there those substances are constantly excited, by extraneous causes, to a

most widely and simply considered as to substance and force *per se*,—are palpitant spheres; and within the proper boundary of each is going on a fine economic circulation of substance and of motor forces,—the continually renewed spring and energy of which comes from the two great primal motions in which the central active area, the solar center itself,—is perpetually held, i. e., that of rotation, and that of a swift, fine alternating expansion and contraction. Which two motions communicate as it were the cardiac and pulmonic motions to the entire surrounding system. For which two motions—both as to their first origin and beginning in the first initiation of solar centers, and their maintenance so long as those centers last,—the solar centers themselves are interiorly dependent upon the like motions of the spiritual sun. "For that Sun acts these two motions from the Lord." [20]

This is probably because the light and heat motions are listed among the seven things not creatable along with substances, as an inseparable property of substance or any development of its potency of action; so there can be no light and heat motions in the universe, save as the Lord imparts them to it in the first place and momently ever after.[21] Thus for the communication of them the natural universe, as well as the spiritual universe, is directly and momently and forever dependent upon the Lord. "For in the Sun where the Lord is and which is from him, there are these two motions: and hence [they are] in the

species of respiration or animation, and this, both in general and in particular. Apart from such incentives or excitations, the subjects would be bare forms . . subject to collapse . . The same remark applies to the world's atmospheres; were they not to be roused, generally and individually, into something emulous of an animatory or respiratory motion they would instantly . . . change into heavy and sluggish things. . . . Oscillations, vibrations, and modifications are nothing more than reciprocal and alternate expansions or contractions of a mass or volume; of the parts in a mass or volume; or of the individua or singulars in the parts. . . . So likewise in the atmospheres of the world:—if they also in general, or in their greatest volume, or in the least volume, that is in their unit [molecule] alternately contract and then regain their pristine dimension, then, of course, there is no reason why these actions should not be likened to the modes of respiration: for in both cases there is expansion and constriction: and in both cases the subjects are roused to perform operations corresponding to their form." (*Animal Kingdom*, 392 (a, b).)

[20] *Divine Love and Wisdom*, 392.

[21] *True Christian Religion*, 472, 308.

angelic heaven and in the universe.[22] Thus they are from the Lord; for the Lord only can impart to solar centers the perpetual spring of their radiant light and heat motions.

Now the force of both these solar motions is a centrifugally-directed force; and that from the very initiament and first beginning of an active solar area in the expanse of the primal ether, or First Aura. Thus it would tend to drive all bodies subject to it directly away from the solar center; and that at a great speed.

But there is a second thing to be considered as bearing not less upon the question immediately in hand. This is the rotary drift of the entire solar sphere.[23] This drift is immense; its velocity high; and it affects the motion of every body coming within range of its action. But the layers of this sphere at various distances from the solar center, perform a complete rotation in different times. For instance, in our own solar system the layer nearest the sun revolves with a period about coincident with that of the sun's own rotation, while at the distance of the earth's orbit the period of revolution is some 365 days. Now in every solar system this drift has to be reckoned with; and that from the initiament of the solar area; for the mass and sphere of the magnetic ether is formed about the new solar center previous to the formation of the primordial planetary substance; its gyre and flow being indeed that very stream which, taking the planetary masses while they are as yet an uncondensed congeries of inchoate matter, in fiery freedom of motion bears them in helix gyres, shaping and massing as they go, to that place in its own swirl where the total of substance and kinetic energy in the planet proper, *plus* the like total in the locally surrounding sphere of the electric substance—will be equal to the total of substance and kinetic energy in the volume of magnetic ether displaced by the planet *plus* its surrounding-sphere of electric substance Swedenborg calls the third ether, or finest tellurian.

And if this be so, this drift has to be reckoned with in the interpretation of the spectra of celestial bodies. For it makes it certain that the medium through which the light of the bodies

[22] *Divine Love and Wisdom*, 381.

[23] *Principia*, Part I., Chap. X., 6. Part II., Chap. I., 22. *Lesser Principia*, 124-5.

is transmitted—is a moving medium, with distinct differences of density as well as of speed of motion. And that there is such a medium revolving about Nova Persei is to be inferred from the gyre the successive midsummer and early fall photographs showed in the fine nebulous condensations surrounding the new star; and also the computed velocity of that gyre at that distance would perhaps give a basis of general estimate as to the time of rotation in the layers nearer the center itself, if compared with what is known of the like rotation in our own system.

Yet, in turn, we should consider that this magnetic sphere did not always exist about the solar center; that in fact the very ether-substance of which it consists only began to be moulded close about that center at a period immediately following the formation of any considerable volume of the Third Finites, or primitives of hydrogen and the metals; and although the magnetic ether was formed in the midst of a rotary movement of the Primal ether, and is itself by nature most apt for the like movement, yet it had to be flung out from that center toward its place of equilibrium, with tremendous outrush and radial expansion, gyring as it went, before it all settled down to its place and the gait of its regular rotation.

Therefore about *novæ,* at that early epoch we should find evidence of the radial outrush predominant over the evidences of rotational drift, although that also must exist. But in old established solar centers we would find the precise contrary,—i. e., the settled rotational movement predominant over the radial; only so much of the latter being present as sufficed to keep up a quiet circulation in and out at the poles and from center to circumference through the vast vortex wheel of that immense field of magnetic ether which surrounds the solar center as an inseparable companion, going with it when it goes, revolving with its rotation, bearing the planets in its flow, and marking the confines of that particular solar system by the limits of its mass.[24]

[24] The centrifugal swing and push of this entire rotary motion, characteristic of active solar areas as wholes, being less at their poles than at their equators, of itself furthers and impels a continual inflow of the surrounding ether volume at the poles and outflow at their equatorial belts, which affords a powerful central spring of stimulus and re-

But the mention of the midsummer photographs of Nova Persei leads us to the second series of data concerning it; which is perhaps the most interesting of all. For the later series of photographs not only developed the certainty of a structural connection between sundry faint and rapidly fading nebulous swirls surrounding the *nova*, but they made certain the fact, "before the light of the nebulous wisps and condensations went out," that those condensations were in the gyre of a mighty whirl around the new star, at velocities only comparable to the speed of our planets around their sun; the like of which had never been dreamed of in the heavens before,—nor such speed nor the fiftieth part thereof, measured among the stars.

The record of this most notable second series of data covering what is known of "celestial events" attending the appearance of the new star, runs as follows:

*Science*, November 29th, 1901, states that "in August, photographs were secured at Heidelberg of extremely faint patches south of the star. September photographs, Yerkes Observatory, showed nebular cloud; very nearly circular, varying in intensity in its different parts, with the new star situated near

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newal to the circulations of that large vortical flow of the surrounding volume of ether,—to which indeed the two higher ethers are natively apt and prone whenever and wherever active centers are afforded them for its beginning and maintenance.

In the second place, it is to be noted that while the *Lesser Principia* says certain first-finites,—normally existent between the molecules of Primal Ether,—when that ether begins to be compressed by new forces set up by the activities of the newly established solar center,—being expressed from between those molecules, can betake themselves nowhere save toward the poles; where they may even enter the Active Solar area itself; in which space they are able to abide and be in full freedom of their inherent orbital motions. Yet, since Swedenborg's postulate definition of an active space, or area, is that any finites existent therein shall be so few relatively to the given area that they are at once in full freedom of individual Kinetic activity; and, practically, never collide, —it at once becomes apparent that we cannot look to these finites themselves for the cause either of the establishment, maintenance, or impletion, of such active solar areas amid and against the surrounding pressures of the universe; and that the two great characteristic motions of Solar centers which are the springs and centers of energy to their dependent spheres, are in no manner whatever, even remote, an additive product of the inherent orbital motions of those finites which have, in the given space, found refuge, harbor, and freedom of activity:

But for these things, in beginning and continual maintenance, the serene and omnipotent activities of the Infinite, present in space, without spatial limitations, are alone adequate.

the middle of the nebulous ring. And later photographs, when compared with those of September, made certain that the brightest portion of the nebula, and perhaps the whole, had moved to the south-east more than one minute of arc in six weeks. Motion on this enormous scale or a fiftieth part of it has never been observed for any celestial body outside of the solar system."

The event was of sufficient importance to telegraph from place to place and to the editors of scientific journals. *Nature* (November 21, 1901) reports on the photograph of *Nova Persei,* little or no nebulosity immediately about it; completely surrounding the new star, however, is a large elliptical belt of nebulosity, with patches of varying density, the most intense being in the southern half of the ring; the latter, probably identifiable with the four principal condensations previously noted, show evidence of motion of those constituent portions of the nebula. Structure of the nebula very complex;—question whether it is spiral or consists of several annuli with interlacing branches cannot be decided. A later note is made, November 17th;—that the nebula surrounding the new star is probably expanding in all directions.

The *Astro-Physical Journal,*—October,—gives the report of the Yerkes observations of the nebulosity about the *nova* from the photo of September 20th, as showing little or no nebulosity immediately about it, although two nebulous wisps extend from the Nova toward the west, curve north, and merge into the convolutions of the nebula proper. The nebula itself is of complex structure;—difficult to discover whether it was spiral, or consisted of several rings with interlacing and merging branches. In the same number of the *Astro-Physical Journal,* E. E. Barnard gives some pertinent observations made on No. 2392 with the forty-inch Yerkes Telescope. He found a bright star in a brightish ring of oval form almost incomplete in south portion. This ring was surrounded by a vacuity, outside which was a broad ring of light, less than the inner ring, broken on north. The inner ring was filled with nebulous light, which had a bright spot in it, south. Another bright spot was found coming to focus with the nebula and not with the central star—therefore doubtless a condensation of the nebula.

The December *Astro-Physical* gives a very full report from the Lick Observatory, under the head: "Motion in the Faint Nebula Surrounding Nova Persei." The photograph for November 8th showed that:—

—The strongest nebulosity is very near to the Nova, adjoining it on the south and west. This mass is elongated in a general direction south of east and is nearly two minutes of arc in length. There are a number of very faint wisps south of the Nova—the outer ones being the stronger . . . these outer wisps are concave toward the Nova, on the arc of either a conic section, other than a circle, or of a spiral. . . . To the north of the Nova, and seeming to join it, there is a faint mass of nebulosity, while farther along in the same direction are traces of other masses.

A comparison of this negative with the reproduction from a photograph secured by Mr. Ritchey, with the two-foot reflector of the Yerkes Observatory, on September 20th, reveals some remarkable changes of position in the more pronounced condensations. . . Only four of these condensations are sufficiently defined to make determinations of position certain enough for purpose of comparison. . . The line drawn between these positions—(i. e., positions of the four masses of nebulous condensations on the nights of September 20th and November 7th, respectively), for each condensation, indicates the direction and amount of motion in the interval of forty-eight days. . . It will be seen that the displacements agree well, and amount to about 1½°. The directions are not so consistent and could perhaps be explained by the irregular motions in the nebulous mass, by a general translation of the nebula in one direction, or by a spiral motion. It is certain, however, that the motion is not radial. The amount of motion is almost incredible, being no less than at the rate of 11° per year. The greatest displacement (proper motion) in the stellar Universe so far observed is less than 9″ per annum.

Such an exceptional velocity as is here indicated leaves little doubt of the intimate connection of this nebulous matter with the Nova and its outburst. . . It may be that in the outburst of *Nova Persei* we have seen the formation of a nebula, either planetary or spiral."

To understand the probable significance of the tremendous velocities at which the instanced nebulous condensations appear to be circling the *Nova*,—velocities comparable only with our own planetary velocities,—consider the case of our own solar system. We know that its active solar area possesses a certain motion of translation, at a definite velocity, proper to itself alone. We know, too, that the planets always accompany it as it moves in its own vaster orbit of the ages,—and that they

perpetually subcircle it, as they go. Thus we know certainly that whatever be the absolute velocity of our sun in its own orbit, its planets are moving much faster. For at every step of the sun's own progression, its planets run entirely around it, making one complete revolution at their respective distances. Now an observer situated at some far, skiey distance, at the present age would be able to see and chronicle only the proper motion and velocity of progression of our sun or star, in its own orbit. The higher speed of its subcircling planets would be an unknown thing, because the faint reflected light they possess at present would not carry far across the skiey deeps. But if he had been able to observe our solar system at that earlier epoch of cosmic history, when the primitive substances of our planets were not yet reduced by environmental instrumentalities to their present relative quiescence, but were still in the state of an uncompacted congeries of the primitives of matter (the "atoms" of which atoms are compounded) in such freedom of motion that their stroke and impetus continually struck out upon the surrounding ether those vibrations which send *light* waves flying,—then the path of these planetary congeries of matter circling their star, and the mighty speed of their motions along that path, would have been made manifest to his eyes; even as the light of a burning ship in a maelstrom will render visible on the darkest night both the dimensions of that circle which it is then traveling and the velocity of its motion therein; or as a blazing torch carried by a runner sends information to farthest beholders both of the path in which he is running, and of his speed.

Somewhat such is the information which has come to us from the series of photographs, fixing the successive positions of the several condensation masses in that far-off and rapidly fading nebulous-swirl developed around *Nova Persei,* and giving data to measure the immense velocity at which those dim, flying-radiances are sub-circling the new star; velocities comparable alone to our own planetary speeds about the active center of our own solar system.

All which affords to thought the happy conjecture that in those far blue deeps the ever-creating Lord of Nature and of Force and of Life has but lately initiated and established a new

active solar area in an unoccupied expanse of the Primal Ether; and at once, through the proper activity of that central solar area "as father" and the substance and elastic reactivity of the surrounding Primal Ether as "mother," is fast framing the substances and parts of a new solar system; and that the first-shaped masses of the primeval planetary congeries are even now there flying toward their goals in the circling sphere, bye and bye to be moulded into earths whereon will rise the homes of a human race, new-born there from the Lord; glad to be created; and furnishing new brothers for the labors and the loves of heaven. LILLIAN BEEKMAN.

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## NOTE AND COMMENT.

### THE SWEDENBORG SCIENTIFIC ASSOCIATION.

ANNUAL MEETING.

The Fifth Annual Meeting of the Swedenborg Scientific Association will be held in the College Building of the Academy of the New Church, Bryn Athyn, near Philadelphia, Pa., on Wednesday and Thursday, May 28th and 29th, 1902. All reports and communications for the meeting should be sent to the undersigned before May 10th.

By order of the President,

EUGENE J. E. SCHRECK,
*Secretary.*

4219 Ellis Ave., Chicago, Ill.

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The Program of the meeting of the Swedenborg Scientific Association is given on page 100.

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*Swedenborg and Modern Idealism; a Retrospect of Philosophy from Kant to the Present Time*, by Frank Sewall, M. A., has appeared, after long announcement, from the press of J. Speirs, London. It is a book of 244 pages, and embraces, besides some essays which have already appeared in New-Church and other Reviews, an introductory essay on the

relation of philosophy or of rational thought to theology, and a definition of Idealism in distinction from Materialism and also from a "misconceived Transcendentalism." The author uses "Idealism in its broadest sense, meaning thereby the opposite of Materialism." The motive in calling "Idealism simply the opposite of Materialism was to differenentiate between Idealism and the truths of Revelation, or those which we regard as embraced in spiritual Faith." In defining Idealism more precisely he says, "it means belief in a self-active principle, which as Will and Idea is the object of a most immediate and absolute knowing in ourselves, and which is the only efficient cause of the activities and changes we see in the objective world." In subsequent chapters, after a lengthy treatment of "Swedenborg's relation to Aristotle," and of "Descartes and Leibnitz as reflected in Swedenborg," Kant's whole doctrine of cognition is closely compared with Swedenborg's doctrine of the Rational Faculty and of the Two Worlds, the Sensible and the Intellectual, and many coincidences are pointed out. "Progressive Phases of Idealism from Kant to Lotze" embrace notices of Jacobi, Schelling, Fichte, Hegel, Schleiermacher, and Schopenhauer, and a convergence is shown towards Swedenborg's doctrine of Discrete Degrees and of the World as Love, a statement of Swedenborg's doctrine of this dictinctive philosophic concept being quoted from Prof. Lewis F. Hite, A. M., of Cambridge. Recent works of Professors Royce, James and Ladd, of this country, and of Dr. James Ward, of Cambridge, England; Renouvier, of France, and other European philosophers, are quoted in illustration of the approach in contemporary philosophic thought to Swedenborg's doctrine of the creation of the universe by discrete degrees out of love with a view to an immortal redeemed society of souls. The work also embraces Essays on "Philosophy as affected by Nationality" and on "John Addington Symonds," republished from the "New World" quarterly review.

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The habitability of other worlds than ours is discussed in a most engaging and yet thoroughly scientific manner by Garrett P. Serviss in *Other Worlds; Their Nature, Possibilities and Habitability in the light of the latest discoveries;"* D. Appleton & Company, publishers, New York, 1901. To those who are interested in modern scientific corroborations of Swedenborg's distinct teaching of the habitability of the "earths in the Universe" this book will especially appeal. While the author finds it hard to conceive of some of the planets such as Jupiter and Saturn, for instance, as being adapted, in their present liquid condition for the habitations of human beings, he mentions nevertheless the possibility of their being a solid and habitable planet within the nebulous sphere revealed to our vision by both these planets, and he concedes generally the rationality of the hypothesis that the planets of our solar system are made for habitation, and that many of them at present are

adapted for the existence of beings who resemble ourselves in general, if not in every particular of physical requirements. In his preface the author says:

"The point of view in this book is human interest in the other worlds around us. It presents the latest discoveries among the planets of the solar system and shows their bearings upon the question of life in those planets. . . . It indicates what must be the outlook of the possible inhabitants of some of the other planets towards the earth." . . .

"The subject [of habitability] is by no means abandoned to the tellers of tales and the dreamers of dreams. Men of science eagerly enter into the discussion of the possibilities of other worlds. . . About Mars in particular a lively war of opinion rages. One side holds that Mars is not only a world capable of having inhabitants but that it actually has them and that they have given visible proofs of their existence and their intelligence, through the changes they have produced upon its surface." "And not only Mars but Venus,—the beauteous twin sister of the earth, who, when she glows in the evening sky, makes everybody a lover of the stars,—and even Mercury, the Moor among the planets, wearing "the shadowed livery of the burnished sun," to whom he is "a neighbor and near bred," and Jupiter, Saturn, and the moon itself—all these have their advocates, who refuse to believe that they are lifeless globes, mere reflectors of useless sunshine. The case of the moon is, in this respect, especially interesting on account of the change that has occurred in the opinions held concerning its physical condition. For a very long time our satellite was confidently, and almost universally, regarded as an airless, waterless and lifeless desert, a completely "dead world," a bare, dessicated skull of rock, circling about the living earth. But within a few years there has been a reaction from this extreme view of the lifelessness of the moon."

Treating of the rings of Saturn the author says:

"In this respect the mystic Swedenborg appears to have had a clearer conception of the true nature of Saturn's rings than did Dr. Dick; for in his book on the 'Earths in the Universe' he says,—using the word 'belt' to describe the phenomenon of the rings:

" 'Being questioned concerning that great belt which appears from our earth to rise above the horizon of that planet, and to vary its situations, they [the inhabitants of Saturn] said that it does not appear to them as a belt, but only as somewhat whitish, like snow in the heaven, in various directions.' "

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Professor Simon Newcomb, in his article entitled "The Fairy Land of Geometry," in *Harper's Magazine* for January, speaking of the theories of the "Fourth Dimension," remarks that,—"it is very curious that in these mathematical speculations the most rigorous mathematical methods correspond to the most mythical ideas of the Swedenborgian and

other forms of religion. Right around us, but in a direction which we cannot conceive any more than the inhabitants of "flat-land" can conceive up and down, there may exist not merely another universe but any number of universes. All that physical science can say against this supposition is that even if a fourth dimension exists, there is some law of the matter with which we are acquainted which prevents any of it from entering that dimension, so that in our natural condition it must forever remain unknown to us." This recognition by Prof. Newcomb of Swedenborg's doctrine of the two worlds of discrete degrees of being, one being composed of fixed matter, the other of spiritual substance and its states, the lower being unable to enter the higher, would be more perfect if it were freed entirely from the self-contradictory notion of a "fourth dimension of space," which theory seems like a vain effort to attach dimension to that which is by its very assumption dimensionless. For space, of its very nature, is finite because it involves the idea of large and small, whereas the infinite and the absolute are not to be conceived of as large or small, and spirit partakes of the infinite, in this respect, as having no spacial dimension. At the same time the spiritual world, as the object of spiritual experience, must have the appearance of spaces and spacial dimension to finite minds there, just as everything seen by the mind in nature has to be viewed through the mind's lenses of time-and-space-relations. To be beyond these relations is not to attain, however, to a fourth dimension, but only to be in a world where dimensions are the mind's projection upon its environment, and not a relation unalterably fixed in matter.

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A friend sends a clipping from the Boston *Transcript*, in which a correspondent, not named, says: "In justice to the cause of truth, I cannot permit to pass unnoticed Sir Robert Ball's failure in his recent course of Lowell lectures to mention the name of Swedenborg among the earliest originators of the nebular hypothesis. [?] Professor Ball seems to have fallen into the common error of giving to Kant a much more prominent place than he really deserves, and I think it about time the facts were set forth putting the matter in its true light. Kant was born in 1724 and did not publish his great work, "General Natural History and Theory of the Heavens," till 1755. In 1720, four years before Kant was born, Swedenborg wrote his treatise entitled, *Principia rerum Naturalium ab Experimentis et Geometria.* He then proceeds to give the titles of Chapters in the *Principia,* which followed when Kant was only ten years old; and says, "I think it can be stated with perfect truth that of all evolutionists who have existed, Swedenborg was the most perfect. The *Principia,* published as I have said when Kant was only ten years old, was, as it were, a great egg from which he evolved during the years 1734 to 1745 probably what must be considered, when it is

properly put together and understood, the most perfect system of science and philosophy that human mind has ever conceived."

The correspondent, like most New-Churchmen, fails to make the essential discrimination which exists between Swedenborg's cosmogony and the Nebular Hypothesis.

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## SWEDENBORG SCIENTIFIC ASSOCIATION.

PROGRAM OF THE FIFTH ANNUAL MEETING

To be held at Huntingdon Valley, Pa. (R. R. Station, Bryn Athyn).

WEDNESDAY, MAY 28TH.

10 A. M. Meeting of the Executive Committee.
11 A. M. Meeting of the Board of Directors.
2:30 P. M. Meeting of the Association. Reading of Reports and Communications.
4:30 P. M. Annual Address, by the President.
6 P. M. Collation.
8 P. M. Social Reception.

THURSDAY, MAY 29TH.

10 A. M. Meeting of the Association. Election of officers.
Paper by Rev. L. F. Hite: "Introduction to Swedenborg's Work on the Infinite."
Paper by George M. Cooper, M. D.: "Swedenborg's Science and its service to Medical Science."
1 P. M. Collation.
3 P. M. Meeting of the Association.
Paper by Rev. Alfred Acton: "An Analysis of Swedenborg's *Ontology*."
Paper by Rev. C. Th. Odhner: "Historical Introduction to the new edition of the *Principia*."
8 P. M. Meeting of the Board of Directors.

Members and friends of the Association, desiring to attend the two days' meetings, are requested to communicate with Mr. C. H. Asplundh, Huntingdon Valley, Pa., before May 20th, in order that arrangements may be made for their entertainment.

Trains for Bryn Athyn leave Reading Terminal at 12th and Market streets, Philadelphia, at 9:28 and 11:13 A. M., and 1:28, 3:13, 4:23, 5:28, and 6:28 P. M.

E. J. E. SCHRECK,
Secretary.

# THE NEW PHILOSOPHY.

VOL. V. JULY, 1902. No. 3.

## SWEDENBORG SCIENTIFIC ASSOCIATION.

### FIFTH ANNUAL MEETING.

THE Fifth Annual Meeting of the Swedenborg Scientific Association, held in the College Building of the Academy of the New Church, Bryn Athyn, Montgomery county, Pa., on Wednesday, May 28th, and Thursday, May 29th, 1902.

### FIRST SESSION.

WEDNESDAY, May 28th, 3:30 P. M.

243. The meeting was called to order by the President, the Rev. Frank Sewall, M. A.

244. The minutes of the last annual meeting, being in print, their reading was dispensed with.

245. The Chair appointed the Rev. W. L. Gladish and Mr. Alfred H. Stroh a Committee on the Roll, who subsequently reported the following members and visitors in attendance on the sessions of the Association:

### MEMBERS.

*Allegheny City, Pa.,* Rev. W. E. Brickman; *Boston, Mass.,* Mr. Horace P. Chandler; *Bridgewater, Mass.,* Rev. E. F. Goerwitz; *Bryn Athyn, Pa.,* Rev. Alfred Acton, Mr. C. H. Asplundh, Miss Lillian Beekman, Mr. Wm. B. Caldwell, Rev. Charles E. Doering, Mr. Gerald Glenn, Miss Carrie Hobart, Miss M. Hogan, Miss Elsa C. Lechner, Rev. C. T. Odhner,

Miss Luelle Pendleton, Rev. E. S. Price, Mr. Orlando B. Schwindt, Rev. Geo. G. Starkey, Rev. Homer Synnestvedt, Miss Laura H. Vickroy; *Chicago, Ill.,* Mr. Arthur W. Burnham, Mr. F. Sherman Layton, Rev. E. J. E. Schreck; *Cincinnati, O.,* Rev. L. P. Mercer; *Cleveland, O.,* Rev. Myron G. Browne; *Dorset, Vt.,* Rev. S. M. Warren; *Huntingdon Valley, Pa.,* Rev. Alfred Acton, Mr. Alfred H. Stroh; *Indianapolis, Ind.,* Rev. Willis L. Gladish; *Lakewood, O.,* Rev. James Taylor, Miss Anna Wagar; *La Porte, Ind.,* Mr. Wm. Niles; *New York,* Mr. Edmond Congar Brown, Mr. Charles T. Champion; *North Cambridge, Mass.,* Rev. L. F. Hite; *Philadelphia, Pa.,* Dr. W. B. Boggess, Dr. Geo. M. Cooper, Rev. Emil R. Cronlund, Mr. Charles Duncan, Mr. K. Knudsen; *Pittsburg, Pa.,* Rev. Reginald W. Brown; *Toronto, Can.,* Rev. F. L. Higgins; *Washington, D. C.,* Rev. Frank Sewall, Dr. John R. Swanton, Miss Mary L. Barton, Miss Ida W. Hunt.

### Visitors.

One hundred and fifteen visitors were in attendance at the meeting, of whom seventy-two were from Bryn Athyn, the rest being from Abington, Mass.; Allegheny, Pa.; Baltimore, Md.; Berlin, Can.; Brockton, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cincinnati, O.; Cleveland, O.; Lakewood, O.; New York City; Norwalk, Conn.; Philadelphia, Pa.; Pittsburg, Pa.; Toronto, Can.; Washington, D. C., and Woodbury, N. J.

Among the visitors were Mr. Louis B. Pendleton, the Rev. J. F. Potts, the Rev. S. S. Seward, the Rev. John Edward Smith, Mr. C. A. E. Spamer, the Rev. Louis H. Tafel and Mr. J. R. Hunter.

246. The Report of the Board of Directors was called for, but its reading was, on motion, postponed until the morrow morning.

247. The Secretary's Report was read; and on motion, duly seconded, was accepted. [See p. 121.]

248. The Secretary moved that a copy of the printed proceedings, duly signed in autograph by the Secretary, be hereafter considered the official record of this Association.

249. The motion was discussed by Messrs. Hite and Schreck.

250. The motion was carried unanimously.

251. The Treasurer read his report. [See p. 121.]

252. On motion, duly seconded, it was

Voted that the report be accepted and referred to an Auditing Committee to be appointed by the Chair.

253. The Chair appointed Messrs. Cooper and Caldwell.

254. The Report of the Committee on a New Edition of the *Principia* was read. [See p. 127.]

255. The Report of the Committee on a New Edition of the *Animal Kingdom* was read. [See p. 128.]

256. The Committee on the Translation of Swedenborg's *Early Swedish Scientific Treatises* reported progress.

257. The Report of the Committee on the Transcription and Translation of the *Lesser Principia* was read. [See p. 128.]

258. The Report of the Committee on the Translation of the Work on the *Senses* was read. [See p. 129.]

259. The Report of the Committee on the Publication of Swedenborg's Scientific Manuscripts was read. [See p. 130.]

260. A Report by Mr. Alfred H. Stroh on the Transcription of Seven of Swedenborg's Photolithographed Manuscripts was read. [See p. 134.]

261. The Report of the Editorial Board was read. [See p. 126.]

262. Miss Lillian Beekman reported that understanding that Mme. Chevrier's letter had been answered she did nothing further in the matter. (See minutes 209, 210 of the last annual meeting.)

263. Mr. Acton referred to the publication by the Rev. James Hyde in *Morning Light* for May 10th, 1902, of a poem attributed to Swedenborg when he was twelve years old, and moved the adoption of the following preambles and resolution:

*Whereas,* This meeting has heard with great interest an account of the poem by Swedenborg published by the Rev. James Hyde in *Morning Light* for May 10th, 1902; and,

*Whereas,* This poem is the earliest known writing by Swedenborg, and one to which the attention of the Church has never before been directed,

*Resolved,* That the Secretary of this Association be request-

ed to communicate with Mr. Hyde, asking him for such particulars respecting the poem as he may be in a position to give.

264. The Resolution was discussed by Messrs. Mercer, Odhner, Schreck and Hite.

265. The motion was carried.

266. The President read his annual Report and Address.

267. The annual communication of the Principia Club, of Bryn Athyn, was read. [See p. 135.]

268. On motion of Mr. Mercer, duly seconded, it was voted that the Chair appoint a committee to nominate the officers of the Association for the ensuing year. The Chair invited nominations for the committee, and then appointed Messrs. Gladish, Acton, Swanton, Mercer and Odhner.

269. On motion, duly seconded, it was voted that the sessions on the morrow begin at 9:30 o'clock in the morning and at 2:30 o'clock in the afternoon.

270. On motion, adjourned to 9:30 A. M. tomorrow.

## Second Session.

Thursday, May 29th, 1902, 9:40 A. M.

271. The meeting was called to order by the President.

272. The minutes of yesterday's session were read and approved.

273. The Report of the Board of Directors was read. [See p. 124.]

274. Mr. Odhner, on behalf of the Nominating Committee, reported the following nominations:

*For President*—Rev. Frank Sewall.

*For Secretary*—Rev. W. L. Gladish.

*For Treasurer*—Mr. Carl Hj. Asplundh.

*For Additional Members of the Board of Directors*—Rev. L. P. Mercer, Dr. Riborg Mann, Rev. John Whitehead, Dr. Harvey Farrington, Rev. Alfred Acton, Rev. E. J. E. Schreck, Rev. L. F. Hite, Dr. John R. Swanton, Dr. George M. Cooper.

275. Mr. Hite moved to substitute the name of the Rev. E. J. E. Schreck for that of the Rev. W. L. Gladish for Secretary.

276. Mr. Schreck gave his reason for not desiring the nomination, but on assurances of voluntary assistance in his duties of Secretary by the nominee of the Committee,

277. Mr. Hite's motion was *carried.*

278. On motion of Mr. Mercer, duly seconded, the name of Mr. Gladish was substituted for that of Mr. Schreck on the list of additional members of the Board of Directors.

279. On motion, duly seconded, the nominations were closed.

280. On motion by Mr. Odhner, duly seconded, the Secretary was instructed to cast the unanimous ballot of the Association for the nominees.

281. Mr. Hite moved that the former action of this Association, looking with disfavor on interpretative prefaces to Swedenborg's works (see minute 153, Proceedings of 1900), be rescinded.

282. Messrs. Mercer, Price, Swanton and Odhner favored interpretative essays printed apart from Swedenborg's works, but objected to interpretative prefaces to these works. Messrs. Hite and Starkey considered such prefaces necessary, but that some of the prefaces heretofore published were open to criticism. Bishop Pendleton favored a preface that summarizes the contents of a work in Swedenborg's own language.

283. The discussion developed a favorable sentiment to regard the term "historical" as large enough to cover such a preface as suggested by Bishop Pendleton.

284. Mr. Hite's motion was put to vote and was *lost.*

285. The report of the Committee on the *Lesser Principia,* which gives a history of the work on this treatise, being reread [see p. 128], and it appearing that the full plan in the appointment of the original committee had not been carried out, it was, on motion, duly seconded,

286. *Voted* that the text of the *Lesser Principia* be referred to the Board of Directors, with full power.

287. The Chairman of the Committee on the Publication of Swedenborg's Scientific Manuscripts, calling attention to the generous assistance given to this Association by the General Convention and by the Academy of the New Church, in the publication of the Manuscripts, it was, on motion, duly seconded,

288. *Voted* that the Committee on the Publication of Swedenborg's Scientific Manuscripts be instructed to present two

copies of the Manuscripts as published to the General Convention, and two copies to the Academy.

289. On motion, duly seconded, it was *voted* that the Committee on the Publication of Swedenborg's Scientific Manuscripts have leave to withdraw their report for correction.

290. On motion of Mr. Odhner, duly seconded, it was *voted* that the Secretary of the Association be made the Keeper of the Archives of the Association, including all manuscripts delivered by its committees, and those presented to the Association.

291. On motion of Mr. Mercer, duly seconded, it was *voted* that the Keeper of the Archives of the Association be authorized to rent a suitable compartment in fire-proof safe, and draw upon the Treasurer for the cost of the same.

292. Mr. Stroh stated that he offered his transcript of the *Worship and Love of God* to the Association, and also his transcript of the other six treatises reported by him, as soon as he may have had an opportunity to revise them. [See p. 134.]

293. On motion of Mr. Schreck, duly seconded, the following Resolution was adopted:

*Resolved*, That the Association has heard with pleasure and satisfaction of the transcript of seven of Swedenborg's Scientific Treatises by Mr. Alfred H. Stroh, and expresses its thanks to Mr. Stroh for the offer of his transcripts when revised by him.

294. The Recommendation of the Board of Directors with regard to Mr. Ford's communication was considered. [See p. 126.]

295. Mr. Odhner offered the following Preamble and Resolution:

*Whereas*, The Swedenborg Scientific Association has learned that Swedenborg's work *De Cupro* has lately been translated into English by Mr. A. H. Searle, at the expense of one of our members, Mr. L. P. Ford, of Great Britain.

*Resolved*, That the Swedenborg Scientific Association hereby expresses its great satisfaction at the work undertaken by Mr. Ford, and its earnest desire that the Manuscript transla-

tion be carefully preserved until means shall have been found for its publication.

296. After discussion by Messrs. Sewall, Odhner and Warren, the Resolution was unanimously *adopted.*

297. Mr. Brown reported verbally in behalf of the New Church Philosophy Club, of Pittsburg, that they have been in existence two years and have studied the *Principia* and the *Animal Kingdom.*

298. The Secretary called attention to the Report of the Treasurer, in which he declares the need of clerical help.

299. On motion of Mr. Synnestvedt, duly seconded, the consideration of the Treasurer's report was made the order of the day immediately after the noon intermission.

300. The order of the day being the reading of a paper, entitled "Introduction to Swedenborg's Work *On the Infinite,*" by Prof. Hite, the President made some prefatory remarks, in the course of which he referred to Mr. Hite's paper as an abstract of an Introduction to Swedenborg's work, prepared at the invitation of the Swedenborg Society, of London.

301. Prof. Hite then read his paper.

302. The paper was discussed by Messrs. Gladish, Brickman, Sewall and Hite.

303. Dr. Cooper read an essay, entitled "Swedenborg's Science and Its Service to Medicine."

304. Adjourned to meet again after the noon intermission.

## Third Session.

Thursday, May 29th, 2:30 p. m.

305. Mr. Acton read a paper on "Swedenborg's Ontology."

306. The Report of the Auditing Committee was read, and on motion, duly seconded, was accepted.

307. The Treasurer's Report was taken up for consideration.

308. The Secretary reported that the Board of Directors had held a meeting during the intermission and recommends the adoption of the following Resolution:

*Resolved,* That Article III., of the Constitution, be amended by adding the words, "or he may become a life-member by

the payment of the sum of Twenty-five Dollars," so that the article as amended will read:

ARTICLE III.—MEMBERSHIP.

Any person desiring to co-operate in promoting the objects of this Association may become a member by written application to the Secretary and by the payment of an annual fee of One Dollar; or, he may become a life-member by the payment of the sum of Twenty-five Dollars.

309. On motion, duly seconded, the Resolution was adopted unanimously.

310. The Board of Directors also recommends that the Board be empowered to take proper steps for the incorporation of this body.

311. It was moved and seconded that the recommendation of the Board be adopted.

312. The motion was discussed by Messrs. Odhner, Schreck and Acton.

313. The motion was carried unanimously.

314. Mr. Caldwell moved that the Association appropriate Fifty Dollars for the Treasurer, to be expended by him for clerical assistance during the coming year, if the funds of the Association permit.

315. After discussion, the motion was referred to the Board of Directors, with full power.

316. Mr. Schreck moved that the Board of Directors be authorized to change the name of the body to "Swedenborg Scientific and Philosophical Association" when the time comes to incorporate this body.

317. After discussion by Messrs. Odhner, Schreck and Acton, the motion was laid on the table for future consideration.

318. On motion of Mr. Price, duly seconded, the time and place of the next annual meeting was referred to the Executive Committee.

319. Mr. Odhner read his paper, entitled "A Remarkable Tribute to Swedenborg as a Man of Science." (The tribute appearing in the *Wiener Medizinische Wochenschrift*, n. 44, for the year 1901.) [See *New Church Life* for June, 1902.]

320. Discussed by Messrs. Acton, Hite, Sewall, Stroh, Odhner, Synnestvedt.

321. Mr. Hite moved that in view of the generous hospitality of the people of Bryn Athyn, and our delightful experience arising from the beauty of the country and the beauty of the spirit of our hosts, our heartfelt thanks are tendered to the people of Bryn Athyn. And that our hearty thanks are also tendered to the Academy of the New Church for its invitation to the Association to hold this meeting in its handsome new College building, a symbol of one of the uses dearest to the hearts of New-Churchmen, namely, a higher New Church education. Adopted unanimously by a rising vote.

322. Mr. Synnestvedt stated that Dr. C. L. Olds had made a translation of a fragment of Swedenborg's, entitled "A Characteristic and Philosophical Doctrine of Universals," which he had given to the speaker to make what use he wished of it. He accordingly tendered it to this Association, to be delivered after he himself had read it.

323. Prof. Price directed the attention of the Association to an analysis of Swedenborg's early writings published by him in *New Church Life* for 1900, page 580, and entitled "Swedenborg the Poet."

324. The minutes of the day's proceedings were read and approved.

325. On motion, duly seconded, the meeting adjourned.

EUGENE J. E. SCHRECK,
Secretary.

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## THE PRESIDENT'S ANNUAL ADDRESS.

### REVIEW OF THE YEAR.

### A. TRANSCRIPTIONS, TRANSLATIONS AND PUBLICATIONS.

THE fourth year of the existence of our organization shows a gratifying progress in the various branches of our work. Under the first division of our task, as defined in our rules, "The preservation, translation, publication and distribution of the Scientific and Philosophical Works of Emanuel Swedenborg," we have to note the encouragement given to the work

of preservation, by the consent of the General Convention and of the Academy to co-operate with our Association in the translation and publishing in Latin of the Scientific MSS. remaining in Stockholm. The work is already in hand. We are able to give a very encouraging report. We have already on hand the entire work on Salt, consisting of 248 closely written foolscap pages. Besides this there is finished the work on Sulphur, 260 pages, and the work on the Magnet, about 230 pages, in all 738 pages. We have not yet received the two latter, but expect that Mr. Stroh will be able to collate them this summer, during his proposed visit to Sweden, as well as several other works.

The Translation of the Fourth Part of the *Animal Kingdom*, "On the Senses," continues to be published serially in our quarterly, having reached now the Fifth Chapter, on "Vision."

A work of profoundest interest to students of Swedenborg's philosophy is the bringing to light now for the first time of the Third Part of the work on the *Worship and the Love of God*, through its transcription from the photolithographed MS. and translation into English by Mr. Alfred H. Stroh. As this part treats of the "Married Life of the First Pair" and finishes the great allegoric drama of the Creation of the World and of Man, in which the principles of the *Principia* are presented as it were in actual operation, we must regard this completion of the work and its proposed publication by subscription in its completed form as one of the most valuable contributions to the work in which our Association is engaged, and we bespeak for its speedy publication every encouragement and aid. It is gratifying to know that the promises toward this new and at last completed edition of the *Worship and Love of God* are coming in rapidly. We have already been promised $353 from 116 people, including a gift of $100 from Mr. Nicholson, of Ohio, for depositing the work in libraries.

Progress is reported in the translation of the *Lesser Principia*, 38 pages being now completed, the whole work being already transcribed from the photolithographed MS.

A translation of the treatise on the *Diseases of the Fibre* is ready for publication and is in the hands of our Board of Directors.

Swedenborg's treatise on *Ontology,* translated some years ago by Prof. Cabell, at Urbana University, has undergone an extensive revision and is now published in an attractive volume with introduction and index by the Rev. Alfred Acton, of the Academy of the New Church. Better than anything else this brief work establishes the fact of Swedenborg's intimate and profound knowledge of the metaphysics of his time, and of his ability to enter as no tyro upon the great probiems of the universe of mind and matter which had begun to interest human learning.

The work of revising the larger works already published but out of print, with a view to reprint, is progressing slowly but hopefully. The revision, by the American Committee, of the two volumes of the *Principia* is now completed and the notes in the hands of the English Committee. The revision of Vol. II. shows some 224 changes suggested in the Clissold text, between 20 and 30 only being changes of construction, the others verbal and numerical. The revision of the text of the *Animal Kingdom* has covered the first eleven chapters, or 362 pages of that work.

### B. Promulgation.

Coming now to the subject of the promulgation of the principles taught in the Scientific and Philosophical Works of Swedenborg, and not confining ourselves to work done immediately under the auspices of the Association, we note with gratification the able and attractive work of Prof. Charles Byse, of Lausanne, Switzerland, entitled *Le Prophete du Nord,* published during the last year at Paris. While the work is devoted mainly to an exposition of Swedenborg's theology, the pages in the introductory chapter give an admirable survey of his scientific career and publications and set forth in worthy terms his great claims upon the world's attention. After quoting from Swedenborg's letter to Benzelius the ardent ambition of the young philosopher,—"I wish there were a new thing in letters every day to delight the world. There is no lack of people who follow sheepishly along the beaten track, while, in a century, we count barely six or ten men capable of producing anything new founded upon reason," he goes on to describe the

new things brought forth by the wonderful philosophical activity of Swedenborg's mind. Of the *Opera Philosophica et Mineralia* he quotes M. Matter as saying: "This learned work won for its author many and varied academic distinctions," and he proceeds to outline the anticipation of modern science contained in the *Principia.*

"Swedenborg," says Prof. Byse, "introduced here very advanced ideas on the great questions of cosmogony, anticipating some of the discoveries since made by science. Thirty years before Laplace he demonstrated successfully that the movements of the planets are due to the sun which attracts them in its etherial atmosphere, and it is to Swedenborg that the honor returns which was given the great but vain Buffon, of having first mentioned the birth of planets from the Sun. He shares with Sir William Herschel the glory of having determined the place of our Sun and of the system of which it is the centre, as in the immense Milky Way, and with Lagrange the conception of a magnificent theory regarding the periodicity of the movement of the planets. Nearly a century before Priestly and Lavoisier he proved that water is composed of two elements. He has even preceded one of the world's physicists of our age, the genial Faraday, in the discovery of many of the laws of terrestrial magnetism. As to the practical views set forth in this great work (including the *Opera Mineralia*),—'One could never estimate,' says Prof. Schleiden, 'all the improvements that Swedenborg introduced into the minds of his century nor duly estimate how much is owing him by the arts and industries of Sweden.' In Anatomy, Swedenborg is declared by the great Swiss savant, de Haller, 'the prince of the anatomists of his age,' and Benzelius, the distinguished Swedish Chemist, writes to Dr. Wilkinson, the translator of the *Regnum Animale,* 'I am surprised to see how much the author of the *Regnum* has advanced the present state of science.'"

Prof. Byse speaks of the work *De Cultu et Amore Dei* as serving for a transition from the scientific to the philosophic phase of Swedenborg's studies. "It is a study in cosmogony of lofty flight and remarkable beauty. It is a poem in Latin prose, whose style has been lauded by Coleridge and which has hardly an equal outside of the *Paradise Lost* of Milton."

"In a word," says M. Byse, "we have in Swedenborg not simply to do with a man of erudition nor even with a savant who embraces the entire field of the knowledge of his age. Swedenborg is all that, but he is, at the same time, a profound thinker, independent and bold, and he himself assumes the title of philosopher. He has a right to, for the reason that he reduces all scientific notions and hypotheses to a general and very systematic conception of the material and the spiritual universe. Did he have time to read the European philosophers who were

then the leaders of mind? Assuredly; at least so far as that could affect his plan; for even if he does not seem to have taken into account Diderot, Voltaire, Helvetius and Rosseau, brilliant writers who can claim the title of philosopher only in a very diluted sense, he was quite at home in the principal ancient and modern philosophies, as is evident especially from his three treatises entitled, *The Infinite;* the *First Cause of Nature;* and the *Mysterious Bond of Connection between the Soul and the Body.* On these different questions which M. Matter calls the 'great questions of the time' our author has refuted Bacon, Descartes and Leibnitz, and has the merit of having helped to release the world of modern thought from the tyranny of ancient yokes." (*Le Prophete du Nord,* page 32.)

I call attention to this work as the most conspicuous of recent works treating of Swedenborg from the pen of one not an avowed religious adherent to the New-Church Theology, and one whose brilliancy of style and deep philosophical penetration will surely delight every reader.

Here may also be mentioned the work recently published in London, entitled "*Swedenborg and Modern Idealism,* a Retrospect of Philosophy from Kant to the Present time," in which the attempt is made to set forth the real value of philosophic thought in relation to revelation and the procession of Churches, and especially the trend of modern metaphysics toward the philosophic concepts of Swedenborg.

The Introduction by Professor Hite to the forthcoming new edition of the work *On the Infinite,* of which an outline will be presented at this meeting of the Association, is a distinctly new contribution to philosophical literature. It brings to the knowledge of modern thinkers their chief desideratum, a nexus between the infinite and the finite, and a possible ground of connection between soul and body, and so a solution of the problem of the psychophysical parallelism. This solution is found in the doctrine that the Infinite is moved by its end or purpose, and that this end is love. By this doctrine, philosophically presented, the Infinite itself comes from the realms of the unknowable into that of human experience, and so the way is opened to the reconciliation of philosophy and religion—which object is seen to be the animating soul of this treatise. The publishing of the *De Infinito* with this lucid and inspiring introduction which in many ways lays hold of contemporary thought, will, it is hoped,

prove a successful instance of a discussion of the principles of Swedenborg's philosophy "in their relation to the science and philosophy of the present day."

The rapid succession of new discoveries and brilliant hypotheses in natural science in these days, as well as such impressive phenomena as the birth and waning of a new star in the firmament, the discoveries of a new element more subtle than the ether, and the tracing of the first finite of nature farther and farther back towards the Infinite itself, afford to the student of Swedenborg an opportunity to test the stability and the sufficiency of his cosmogony. It is an immense gratification to feel that, throughout the rapid changes and innovations in recent scientific hypotheses, there has nothing occurred to shake the quiet and majestic stability of Swedenborg's great philosophic doctrines of Series and Orders and of the Discrete Degrees, End, Cause and Effect, and their Correspondence. Instead of advancing beyond these, or of, in any way, showing their insufficiency, all the highest thought seems to bear the foregleam of these great luminaries for the new scientific age. At the same time it may be profitable to reflect that the nominal acceptance of an hypothesis merely on the score of its author's reputation does not really constitute an advancement in general learning, and that before the students of Swedenborg themselves lies perhaps the chief scientific problem of the age, viz., that of applying his principles, not so much to the theoretical world-process, which is necessarily a field for imagination, but to the particular problems that are now constantly presenting themselves. Among these there is probably none more urgent than that of the objective reality of the Spiritual World, the adding of another continent, so to speak, to scientific knowledge. If we regard spirit itself and the spiritual world as constituting a field of knowledge which in itself is strictly "spiritual" in distinction from "natural," and whose source is wholly in direct divine revelation, then we cannot claim that science and philosophy are essentially advanced by even so complete a system of knowledge as Swedenborg's works contain. For revelation begins where science or man's own ability to discover ends. On the other hand, if what Swedenborg relates to us from things "heard and seen"

in the spiritual world is avowedly given as facts of human experience, however extraordinary, and as belonging to the realm of science as truly as the observations we enjoy in the natural world, then we have what constitutes a new and stupendous addition to the data of scientific knowledge. This knowledge, it must be admitted, is unique in its character, and, according to the claim of its discoverer, it is by a special Divine dispensation that it is given to the world at this time, as at no other time known to history. But that does not change its character as *visa et audita,* as *knowledge derived through the senses,* and therefore as subject to the laws of the human mind in relation to all cognition.

### THE SUBSTANCE OF THE SPIRITUAL WORLD.

Perhaps the most practical question before the scientific disciple of Swedenborg is this: What is the real nature of the Spiritual World? Its reality he is prepared to assert and defend; its character as a world of "appearances of times and space," and therefore of possible human experience, he can also describe in formal terms. But that its substance is spiritual and not material he must also maintain in accordance with the doctrine of the discrete degree between the spiritual and natural worlds, and therefore he must meet the ultimate question "of what substance is the spiritual world?" As spiritual substance we know of it as truth and good. We can think of truth and good as the substance of our subjective experience, but can we experience them as objects of sense? Can we know a world *around* us as well as *within* us whose only substance is good and truth? And for our answer to this we are driven to the fundamental principles of knowing itself. What constitutes an object of sense? Does the spirit in knowing know that which is not itself, or that which is of the same substance as itself? Old as the problem is—for Aristotle has discussed it and every metaphysician since his time who has thought deeply enough—has Swedenborg really furnished its solution, and so made a distinct addition to mental science? Believing that if he has done so, it will be along the line of his doctrine of Series, Degrees and Correspondences, I may be permitted to suggest some thoughts in this connection that will not be alto-

gether foreign to those that are engaging thoughtful men of science everywhere.

Recalling what we may call the evolution of the doctrine of the Atom, or of the First Finite, we shall find that this has, since Newton's time, passed through five stages:

I. Mechanical: The Atom as a hard body of appreciable bulk and weight. (Newton.)

II. A Point without dimensions, but endowed with potential force. (Boscovich.)

III. Kinetic. A kind of energy. (Maxwell.)

IV. Vortical. Vortices of motion in a frictionless medium. Material, incompressible. (Helmholtz and for a time Kelvin.)

V. The electron. Penetrating all substances.*

Of these several degrees of matter, or degrees of substance, J. Clark Maxwell, author of article on "Atom" in the *Encyclopedia Brittanica,* makes the following admission:

"Science is incompetent to reason upon the creation of matter itself out of nothing. We have reached the utmost limit of our thinking faculties when we have admitted that, because matter cannot be eternal and self-existent, it must have been created. It is only when we con-

*In a brief interview which it was my privilege to enjoy with Lord Kelvin on the occasion of a reception tendered him by the Cosmos Club on his recent visit to Washington, on my calling his attention to the coincidence of his own hypothesis of a "vortex in a frictionless medium" with Swedenborg's doctrine of the "conatus of motion in the infinite," which I understood he had lately receded from; "Oh, certainly," said he, "we have abandoned all that and gone back to the atom of Democritus and even of Boscovich." "Of Boscovich, indeed!" said I, as in the pressure of guests the little conference was brought to a close. Boscovich, it will be remembered, was a brilliant scientist and astronomer, the contemporary of Swedenborg, who invented a theory of the atom as a point without dimension in space, but *being simply a center of potential energy.* This still resembles Swedenborg's doctrine of the first finite perhaps as much as does the vortex of motion theory of Helmholtz, which Lord Kelvin thinks he has set aside. If we look beyond names to things we shall see that what all this scientific thought is leading towards, is a nexus between the finite and the infinite which, like the "point" in Swedenborg's *Principia* (Pt. 1, Chap. 2), shall be spiritual and open to the infinite in its one aspect, and finite and material in the other. See Swedenborg's "Introduction to a Philosophical Argument on the Mechanism of the Intercourse between the Body and the Soul," being the Second Part of the work *On the Infinite.*

template not matter in itself, but the form in which it actually exists, that our mind finds something on which it can lay hold."

That is to say, the mind can lay hold of form, but not of matter itself. And if form is not substance, but the relation of parts to a whole, and if relation is something apprehensible by mind alone, then does not all knowing reduce itself to the apprehension of forms? Does not all knowledge of an objective world, whether that world be a material or a spiritual world, consist wholly in its various forms becoming subject to the mind's interior judgment of relations?

Of the substance lying behind these forms—what Kant would call the *"Ding an Sich,"* and what Swedenborg calls spiritual substance, or whatever it is that puts on even in the spiritual world the "appearance of time and space" in order to be thinkable or "heard and seen" by the human spirit, we may find some assistance in tracing in a very simple way the progressive phases of our ideas of substance in purely natural experience. What answer can we give as to what substance even in nature is behind the material objects which appear to the mind? Every object known, gross and ponderous, is reducible to its molecular or atomic particles, and these, as we have seen, to some phase of material existence so subtle as to defy any of the senses and become only an inferred cause of motion. In other words, the atom has almost literally been reduced to a thought, or at most to the most convenient symbol of an idea. In its ether, not to advance further into that attractive world of its longing gaze,—possibly Swedenborg's aura,—the science of today has demonstrated that what is quite invisible and intangible to any senses we possess, may, nevertheless, be substantial in a very practical and real sense. An invisible world therefore may be a substantial world, and its substance may be something in no way subject to the dimensions of matter. This is a perfectly reasonable inference from those degrees of substance which science recognizes. If we imagine four perfectly transparent crystal cubes before us, one a solid crystal, one a crystal vessel filled with clear water, one such a vessel filled with air, and one a vessel from which the air has been exhausted, we shall have an illustration of four degrees of material substance. It will illustrate also the com-

mon illusion of our senses regarding substance. It would seem as if the solid crystal had much more substance in it than the cube hollowed out and filled with water. And, with the water poured out and only air left, it would seem as if the cube were practically empty of substance; and when we have exhausted the air we would not hesitate to say that we had "produced a vacuum;" that there was "nothing left" in the cube; and yet in reality, and as admitted by science, the substance left in the cube is the most real, enduring, the most powerful and indestructible of all the substances of nature. You may destroy the glass cube by breaking it in pieces, you may evaporate the water, you may exhaust and remove, rarify and intensify the air, but the ether you cannot touch to destroy, exhaust or change. It is then the medium of the most powerful and terrible of elementary forces. It holds the vast universe in one compact mass. It says: "There shall be no vacuum. I am everywhere."

If such be the gradations of substances cognizable even to physical science, who shall authorize us to make our final stand in the ether, and to say there is no degree or kind of substance beyond? Is not the savage as truly qualified to deny the substantiality of the air because he cannot see it as is the modern psychologist to deny the substantiality of spirit because it is not tangible to our natural organs? But conceding that the idea of spiritual substance, and so of a spiritual world, has nothing contrary to reason in it, we are still reminded that to be a world it must be objective to the seeing subject. It must be a world seen and felt by the spirits that inhabit it, and so it must become a visible substance and a visible world.

This is only saying that what is invisible to one order of faculties may be visible to another, and that, corresponding to the degree and step from material to spiritual substance, there is a step in man's power of vision to a higher order of sensuous perception. It is to assume, in a word, that there is, adapted to the spiritual world, a spiritual body with sensuous organs adapted to the substance and laws of that world. We find something analogous to these grades of sensuous perception even among animals, especially among the birds and insects to whose eyesight and to whose hearing things are per-

ceptible which are entirely beyond our power to see and to hear, just as to familiar domestic animals the sense of smell, if not the general sense of touch, is developed to such a degree that they have a power of location, of finding their way, and knowing where they are, entirely beyond any faculty possessed by man.

Thus from the gradations in nature we may reasonably infer the further gradation of the spiritual substances constituting an objective world, visible and tangible to the refined or more completely developed senses—the unveiled senses we might call them—of the spiritual body. Analogous to the ether waves of the natural world, the bearers of light, are the thought waves of the spirit, the bearers of truth: analogous to the heat waves, the "modes of motion" of the natural universe, would be the will waves, those first motor waves of all activity natural or spiritual, the life-giving, the all-moving and all-sustaining beams of a central sun, fed and stirred by the direct impulses of an Infinite Divine Love. That thought should travel on waves of objective thought, and that our senses should perceive will as an objective substance, that, in a word, we should, in a spiritual world, find the very atmospheres around us of the same substance as that of which our minds consist, is a condition difficult to realize under the present controlling influences of a material world. Yet analogies to these very conditions are not wanting in the nature of light and the relation it bears to sight in this world. Even Aristotle, in his profound analysis of sensation, in his work on the *Soul,* came to this position, that in the moment of sense-perception of an object the object perceived and the perceiving object were one, and that sensation consisted in the mind's finding itself in touch with a certain *spiritual* reality and form in the object, which form was itself not material, but substantial, and affording to matter all that made it an intelligible thing. Thus just as sight is in reality not the mere contact of fine atoms, but is rather the spirit's interpretation of the ether waves that pervade all space, so in the spiritual world sight is the recognition by each spirit in its own way of that universal Truth which is the omnipresence of God's spirit, giving form to all things and enabling the human soul more

and more to all eternity to realize the promise of Revelation: "In thy light shall we see light."

This seeing of truth objectively may, after all, be by a process in nowise different from that of seeing light objectively. Both are visible by virtue of having form, and form to be real must be a form of substances. The substance of the form of physical light is heat; the substance of the form of spiritual light or truth is good, but heat and light become sensible through the atmospheres of the natural world, and good and truth become sensible through the atmospheres of the spiritual world, which are uses subserving the life of man as a spirit or angel. What these uses are which constitute the atmospheres of our environment in the spiritual world we can no better define than that they are like the uses that exist in air and sunshine. They are not yet particularized, whether in sounds of harmony, in forms and colors of beauty, or in articles that nourish and protect the body; but they are not less real and not less appreciable because thus general and universal in their aspect. So may it not be with the diffusion of the divine light and heat which are truth in the spiritual world, and their effect upon the senses of the spiritual body there?

In venturing to suggest this line of thought as a practical application to psychological and scientific problems of the present day I have only been following the example given in Swedenborg's work on the "Mechanism of the Intercourse," etc. (*De Infinito*, Pt. II., Sec. VI.) If the science of Swedenborg is to be brought into touch with the science of the world at large, it will have to be—as I believe we shall all have to concede—along the lines marked out in the work *On the Infinite*. If we are to contribute to the solution of these problems, we must avail ourselves of the philosophical arguments afforded in this and the other scientific works. If it be said that Swedenborg himself did not revert to his scientific researches and arguments after his illumination, it may be replied that neither does the house itself reveal, but rather hide the foundations, which are nevertheless there; and that Swedenborg expressly avows that spiritual truths rest on the basis of natural truths. (*De Commercio:* 20.)

Israel was indeed also brought up out of Egypt and planted

in the Holy Land, never as a people to return to the land of bondage; but the Incarnate Word, the Saviour, when He came to renew His Church and establish His everlasting Kingdom still must needs go down into Egypt and be brought up thence; showing us by a parable of Infinite Wisdom that every great movement of spiritual reform, while called and inspired and instructed from above, must yet be grounded in human experience and accepted by the free rationality of the human mind.

FRANK SEWALL.

Washington, D. C., May 19, 1902.

## REPORT OF THE SECRETARY.

THE minutes and reports of the last meeting have been published in *The New Philosophy* for July, 1901. The Secretary has considered it unnecessary to incur the expense of typewriting the proceedings as was done in the past, and preserves a copy of the printed record as the official journal of the proceedings.

Since my last report four members of the Association have died, two have withdrawn and thirty-seven have been added to the roll, showing a present membership of 171, a net gain of 31.

EUGENE J. E. SCHRECK,
*Secretary.*

## REPORT OF THE TREASURER.

*To the President and Secretary of the Swedenborg Scientific Association:—*

THE Treasurer's Annual Report is herewith presented to you, and while the receipts and expenditures have been given somewhat in detail, he desires to point out some particulars about the finances of the Association.

At the last year's meeting there was a balance of $8.27, as against $1.46 this year, but last year there was an item of $30.00 for paper unpaid, while this year all bills have been paid up to date.

The report shows among the receipts a payment from the Academy of the New Church of $146.80, being aid toward the publication of the Scientific MSS., and among the expenditures a similar amount paid to J. E. Boyesen on account of copying. A special report on this subject will be submitted by the committee appointed.

It will be noticed that only the January issue of *The New Philosophy* was limited to 32 pages, the others being 40, 48 and 68 pages. This increase in the number of pages was made possible only by special contributions for that purpose. Of the recent April issue an extra edition of 1,000 copies was printed, which were mailed to New Church people. The

purpose of this was to enable a larger number of persons to become acquainted with Swedenborg's work, *On the Worship and Love of God,* of which this issue contained an extended review. A circular letter was sent to these same people inviting them to become members of the Association and subscribers to *The New Philosophy,* and the Treasurer is happy to report that the returns so far have been very encouraging. Our membership has now been increased to 171, from 140 at our last Annual Meeting, and the paying subscribers to *The New Philosophy* to 234 from 173.

The number of subscribers is, however, not yet sufficient to pay even for the small quarterly Journal, and it has therefore been necessary to make use of almost all the funds received for membership fees to cover the cost of the publication of the Journal.

It will be necessary in the near future to have *The New Philosophy* almost entirely supported by the subscribers and by special contributions, as most of the funds of the Association will be required for other uses, such as the copying and publication of the Scientific MSS., and the translation, revision and publication of the English editions of Swedenborg's Scientific Works out of print and those heretofore never published.

The subscription charges to *The New Philosophy,* as well as the membership fees, were fixed at a very low figure in order to enable every one interested in the use to co-operate, but this should by no means prevent those who desire or who are able to assist the Association more generously to do so.

The Treasurer wishes to emphasize this matter, and to invite all members to aid the Association still further by special contributions, in order that the uses of the Association may be carried on more successfully, as without such aid our work will be very slow.

Our expenses have at present been limited to the actual cost of publishing *The New Philosophy,* but there are other expenses not apparent in the report. Among such I beg to call attention to the Editing of *The New Philosophy,* and the clerical work of the Treasurer.

While neither the Treasurer, nor perhaps the Editor-in-Chief, has done all the work connected with their respective offices, the Treasurer can speak for his own department that considerable clerical work is involved in the business of the Association, and it will be necessary to appropriate some money for clerk hire, as the Treasurer cannot continue this work unless he has some assistance.

The Association has great and important uses in view which will involve more work than heretofore, and if our body is to succeed, it will require both labor and capital.

The Association has, in Providence, been furnished with ardent and able laborers; what it now also needs is capital.

Let us hope that the members of the Association will furnish this

according to their means, and the aims of the Association will before long be accomplished.

Respectfully submitted,

CARL HJ. ASPLUNDH,
*Treasurer.*

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ANNUAL REPORT

FOR YEAR ENDING MAY 22, 1902.

RECEIPTS.

| | | | |
|---|---|---|---|
| Balance on hand, May 27, 1901 | | | $8.27 |
| Subscriptions to *The New Philosophy* | $155.61 | | |
| Membership fees | 172.00 | | |
| Special contributions | 85.00 | | |
| | | $412.61 | |
| Aid from The Academy of the New Church toward the publication of Swedenborg's Scientific Manuscripts | | 146.80 | |
| | | | 559.41 |
| Total | | | $567.68 |

EXPENDITURES.

THE NEW PHILOSOPHY.

| | | |
|---|---|---|
| Printing July, 1901, issue, 650 copies, 40 pp. | $42.69 | |
| Printing of October, 1901, issue, 500 copies, 48 pp. | 63.35 | |
| Printing of January, 1902, issue, 500 copies, 32 pp. | 39.23 | |
| Printing April, 1902, issue, 1,500 copies, 68 pp. | 106.05 | |
| Paper for *The New Philosophy*, 22 reams. (Including 10 reams for April, 1901, issue.) | 66.00 | |
| Cover paper for *The New Philosophy*, 2 reams. | 8.40 | |
| Large envelopes for *The New Philosophy* | 4.25 | |
| Electrotyping | 4.82 | |
| Expressage, freight, etc. | 1.80 | |
| Mail lists | 1.25 | |
| | | $337.84 |

SCIENTIFIC MSS. ACCOUNT.

| | | |
|---|---|---|
| Remitted to J. E. Boyesen on Account for Copying Manuscripts | $146.80 | |
| | | $146.80 |

GENERAL EXPENSES.

| | | |
|---|---|---|
| Stationery | $4.08 | |

| | | |
|---|---|---|
| Printing Circulars, Envelopes, etc..... | 19.49 | |
| Travelling Exp, for Sec'y to 4th Annual Meeting ..... | 27.00 | |
| Travelling Exp. of Rev. A. Acton to present Memorial at Convention in N. Y..... | 4.65 | |
| Postage to May 1st..... | 26.36 | |
| | $81.58 | |
| | | $566.22 |
| Balance on hand..... | | $1.46 |

We have examined the books and vouchers of the Treasurer of the Association for the year ending May 22d, 1902, and found them correct and in agreement with the report, which shows a blance of $1.46 on hand.

W. B. Caldwell,
G. M. Cooper,
*Auditing Committee.*

May 29th, 1902.

## REPORT OF THE BOARD OF DIRECTORS.

The Board of Directors of the Swedenborg Scientific Association submits the following report:—

1. The Board has held two meetings, one immediately after the last annual meeting of the Association, namely, on May 27th, 1901, at 1:00 P. M., and the other immediately preceding this meeting, namely, on May 28th, 1902, at 11 A. M.

2. At the first meeting it was voted that the President and Secretary of the Association be respectively the Chairman and Secretary of the Board.

3. The President, the Rev. Alfred Acton, and Mr. Carl Hj. Asplundh were constituted the Committee on the Publication of Swedenborg's Scientific Manuscripts as per minute 214.

4. The Officers of the Association, namely, the President, the Secretary and the Treasurer, were constituted the Executive Committee of the Association.

5. The Board elected the Rev. L. P. Mercer as Managing Editor of "The New Philosophy," and the Rev. E. J. E. Schreck as additional member of the Board of Editors.

6. At the meeting held May 28th, 1902, the following report of the Executive Committee was received and adopted:—

### REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee takes pleasure in reporting the prospect

of an early publication of two treatises by Swedenborg, namely, *Worship and Love of God,* and *Diseases of the Fibre.*

For some time past one of the members of the Association, Mr. Alfred H. Stroh, has been making a very careful study of the work entitled *Worship and Love of God,* including Part III., which has never been translated, and the Latin of which is accessible only in the photo-lithograph edition of the Manuscripts. The results of Mr. Stroh's studies have been published in *The New Philosophy* for April of this year.

Mr. Stroh has prepared a revised translation of Parts I. and II. and a translation of Part III., and offered his MSS. to this Association for publication. The Executive Committee accepted the offer and sent out about 1,400 circulars inviting subscriptions to the work. 116 responses were received, with an aggregate promise of $353.75, including $100.00 from Mr. Ezra Nicholson for 100 copies to be presented to public libraries.

A rough estimate places the cost of an edition of 500 copies, including plates for future editions, at about $750.00. Since more than half of this amount is assured, the Executive Committee recommends the publication of this work without further delay, other than that rendered necessary for a proper revision of the translation, which it is proposed to assign to the Rev. Frank Sewall.

The Academy of the New Church possesses the plates of a translation of the work entitled *Diseases of the Fibre,* made by Dr. C. S. Olds, and originally published in serial form in *New Church Life.* These plates the Academy generously offers to this Association without further consideration than the observance of its contract with Dr. Olds, which calls for an equal division, between publisher and translator, of the net profit arising from sales. Dr. Olds agrees to the transference of the publication to this Association. The Executive Committee recommends the acceptance of the Academy's offer and the publication of an edition of 300 copies as soon as the funds in the Treasurer's hands permit.

7. The Board of Directors wish to recall the fact that in the year 1898 a letter was received from Mr. L. P. Ford, of England, offering to the Association a translation and plates of Swedenborg's work *On Copper.* The Board of Directors took action at the time, expressing the desire to add the work when completed to the Association's list of publications, after examination and approval by our Board of Editors of the *Principia,* and provided that the funds of the Association warrant the publication.

During the past summer the following letter from Mr. Ford was received by the Secretary of the Association:

"At the starting of the Swedenborg Scientific Association, I promised to furnish the translation of Swedenborg's great work on *Copper.* The text is now nearly completed by Mr. Searle, and he is busy with correcting the plates.

"I shall be pleased to know whether the Association is in a position to publish the work, and whether it considers it important enough to warrant the expense.

"It is but one link in the chain of Swedenborg's education and development; but it contains information as to old methods of smelting, &c., not to be found elsewhere.

"Swedenborg's own conclusions and experiments are, I see, contained in another work on Sulphur and Pyrites, not yet even printed; and I am writing to Mr. Manby to ascertain whether he can secure me a copy of the Manuscript in any way.

"I suggest that the work be produced in Royal 8vo, the same size as *Documents Concerning Swedenborg*. It will run to about 832 pages, exclusive of plates, which will bring it up to 900."

The Board of Directors adopted the following resolution at their last meeting when Mr. Ford's letter was read:

"*Resolved*, That the Board of Directors has heard Mr. L. P. Ford's letter in regard to progress in the translation of the work *On Copper*, with great pleasure and satisfaction.

"*Resolved*, That the Board refers the letter to the Association with the recommendation of its earnest consideration."

EUGENE J. E. SCHRECK,
*Secretary.*

## REPORT OF THE EDITORIAL BOARD.

THE transactions of the last Annual Meeting of the Swedenborg Scientific Association were printed in the July number of *The New Philsophy*, together with the paper by W. F. Pendleton on "The Scientific Writings of Swedenborg and the Writings."

The issues for October, January and April have contained, besides installments of Mr. Price's translation of Part IV. of *The Animal Kingdom*, or *The Senses*, the paper by Miss Beekman, presented at the last Annual Meeting, on "The Identification of Hydrogen and Third Finites," with Mr. Beswick's Critical Notes on the same, which he substituted for the paper on the subject sent by him to the Annual Meeting; also articles by Miss Beekman on "The Connection of Respiration with Muscular Control" and on "Swedenborg on the Appearance and Disappearance of New Stars;" one by John Whitehead on "A Neglected Factor in the Doctrine of Evolution;" and articles by Alfred Stroh on "Theories of Light and Color," and "Anolysis and Review of *The Worship and Love of God*." The last mentioned contribution with the paper on New Stars in the April number, enlarged the number to nearly twice its size, which was made possible by the generous offer by a friend of the use, to defray the extra expense, in order that the Association might have the article before the eyes as a whole without division.

In November the members of the Editorial Board who could be called together in Chicago held a meeting to determine the most useful conduct of the magazine. Messrs. Schreck, Mann, Mercer and Farrington were present. It was decided to assign to the several members of the Board the department of review and comment on current topics, as follows: Mr. Whitehead, the subject of Evolution; Mr. Mann, the subject of Physics; Mr. Sewall, Psychology, and Dr. Farrington, Physiology. Under this arrangement "Note and Comment" has been made as follows: "Problems from Kant's Metaphysics," "Creation of First Forms," "Dr. Hershey on the Vermiform Appendix," "Prof. Munsterburg on Mind and Matter," "The Monist on Kant and Swedenborg," "Swedenborg and Modern Idealism," "Habitability of other Worlds," and "Prof. Newcomb on the Fairy Land of Geometry." In this department there has been laid over a good deal of comment on account of the limited space available in our quarterly issue.

At the meeting of the Editorial Board, referred to, the Managing Editor was instructed to secure, if possible, the assistance of George G. Starkey, as being near the publisher, in the work of editing; and while he consented unwillingly on account of his other duties, the Board desires to acknowledge his invaluable assistance in the determination of the contents, form, and creditable appearance of the magazine.

Respectfully submittted,

L. P. Mercer,
Frank Sewall,
E. J. E. Schreck,
*For the Editorial Board.*

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## REPORT OF THE COMMITTEE ON THE NEW EDITION OF THE PRINCIPIA.

During the past year the revision of the 2d Vol. of the *Principia* by the American members of the Committee has been completed. A careful comparison of the Clissold Edition with the original Latin was made by Prof. Mann, of the University of Chicago, and his variations and corrections were afterwards revised by Messrs. Price and Sewall. These notes comprised some 25 or more alterations in sentences and some 224 changes of single words and figures. The revisory notes have been sent to the English members of the committee, Messrs. Tansley and Rendell, and from them we have an encouraging report that in an interleaved copy of the English Edition they are entering the American corrections together with their own, coinciding or varying or additional, and that these notes will be again returned to the American Committee for decision in each point, and then, in England, the final corrections will be entered upon the margin of a copy for the use of the printer. A number of practical questions were submitted by the English brethren in regard to an introduction and other points about

which it may be desirable later to ask an expression of the will of the Association. The revision by the English members is already well on in the second volume.

Respectfully submitted,

FRANK SEWALL,
*Chairman.*

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## REPORT OF THE COMMITTEE ON A NEW EDITION OF THE ANIMAL KINGDOM.

*Rev. Frank Sewall, President of the Swedenborg Scientific Association:*

DEAR SIR—The committee on the revision of the *Animal Kingdom* begs leave to report that it has practically completed the first eleven chapters, or three hundred and sixty-two pages. It would also state that considerable more work is being undertaken than was at first deemed necessary. This has been particularly so with regard to the quotations from the various authors by Swedenborg. For in many cases he quotes parts of sentences or whole sentences from one paragraph, then, without any indication of any omission, he quotes part of another paragraph. In some cases also Swedenborg partly quotes and partly arranges in his own words. All, however, is put in quotation marks. To verify each quotation is difficult; for although Dr. Wilkinson in his translation gives the references to the passages quoted, yet he does not always give Swedenborg, but frequently quotes the passage of which Swedenborg sometimes gives only a synopsis, and so this is not always indicated; the English reader would suppose that all that is in the English Edition is a translation of Swedenborg.

Your committee, in endeavoring to indicate every addition to the text, has found that the work is very much more involved than was expected, but it is making progress, though slowly, and hopes that it will be able to report more progress in the future.

The chairman of the committee takes this opportunity to publicly acknowledge the services of Dr. Farrington in taking charge of the anatomical part of the work, and of Mr. Alfred Stroh in assisting in the revision of the work.

Yours truly,

C. E. DŒRING,
*Chairman.*

May 19th, 1902.

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## REPORT OF THE COMMITTEE ON THE "LESSER PRINCIPIA."

*To the Board of Directors of the Swedenborg Scientific Association:*

OWING to the press of my regular duties, I have practically been unable to do any work on the translation of the *Lesser Principia.*

It might be well, however, for the sake of record, to report the exact course and present status of the work done by the Swedenborg Scientific Association in relation to Swedenborg's *"Lesser Principia."*

In 1898, immediately after the first annual meeting of the Association, the Board of Directors appointed the following gentlemen a committee to transcribe the work from the Photolithographed MS.; Messrs. J. R. Swanton, L. H. Tafel and Charles Dœring. (*New Philosophy,* 1900, p. 29.)

Subsequently the Rev. L. F. Hite was added to the Committee, of which he was elected Secretary. (*New Philosophy*, 1900, p. 58.)

At the second annual meeting of the Association, in 1899, this Committee reported that it had decided to divide the work of transcription among three men, namely, Mr. E. F. Gœrwitz, Prof. S. Vinet and Mr. Reginald Brown, whom it had also elected as members of the committee. (*N. P.*, 1900, p. 58.) It also reported that Mr. Brown had finished his portion of the transcription. (*Ibid.*)

At the third annual meeting of the Association, held in 1900, the enlarged committee reported that "The work of transcribing the *Lesser Principia* is virtually completed." (*New Philosophy,* 1900, p. 99.) It also offered some suggestions as to the translation and editing of the work (*Ibid.*)

At this meeting all the Committees of the Association were discharged, a reorganization of the work being subsequently effected by the Board of Directors.

The undersigned was then appointed by the Board as Chairman of a committee to translate the *Lesser Principia,* and he was authorized to receive the transcription made by Messrs. Gœrwitz, Vinet and Brown.

At the end of the same year (1900) he received from Prof Vinet two-thirds of the transcribed copy, namely, the part transcribed by Rev. E. G. Gœrwitz and that transcribed by Prof. Vinet. Mr. Brown's transcription which covers the last third of the *Lesser Principia* has not yet been received, and is still in Mr. Brown's possession.

The photolithographed MS. includes 342 pages (*Phot. MSS. V.,* pp. 103-444), containing 174 chapters which constitute the *Lesser Principia.* Of these pages and chapters, the Rev. E. F. Gœrwitz has transcribed 111 pages (pp. 103-213), being the first 55 chapters; Prof. Vinet has transcribed 115 pages (pp. 214-328), being chapters 56 to 116, and Mr. Brown has transcribed 116 pages (pp. 329-444), being chapters 117-174.

Thus far only 37 of the 342 pages have been translated into English.

Respectfully submitted,

ALFRED ACTON.

## REPORT OF THE COMMITTEE ON THE TRANSLATION OF THE WORK ON THE SENSES.

*Rev. Frank Sewall, President.*

DEAR SIR—I have to report that as regards the translation of the

work *On The Senses*, by Swedenborg, only about enough for another installment of that work in *The New Philosophy* is done, namely, as far as page 55 of Tafel's Latin edition. As matters are now arranged with me, the translation cannot progress much faster at present, but I hope to be able to make more rapid progress during the coming summer.

Yours sincerely,

ENOCH S. PRICE.

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## REPORT OF THE COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MSS.

*To the Board of Directors of the Swedenborg Scientific Association:*

THIS committee was appointed by your Board to carry into effect a plan prepared by Mr. Carl Hj. Asplundh for the issue, in printed form, of the unpublished scientific and philosophical MSS. of Swedenborg. This plan was laid before the Swedenborg Scientific Association at its last annual meeting, when the following Resolution was unanimously adopted:

"*Resolved*, That Mr. Asplundh's paper be referred to the Board of Directors with the recommendation that the plan outlined be favorably considered and such action be taken as the Board may deem advisable." (*New Philosophy*, 1901, p. 68.)

The plan here referred to, which was published in *The New Philosophy* for 1901, p. 85, contemplated, *First*, That the unpublished scientific and philosophic MSS. of Swedenborg should be copied by a skilled copyist well versed in Latin. *Second*, That the copy thus prepared should be compared with the original by two Latin scholars who should refer special difficulties to the judgment of a third scholar. *Third*, That when a sufficient number of pages has been copied and finally revised by the collators, they should be printed and issued to the public in an edition of 500 bound copies, each consisting of two volumes of about 400 pp. The plan contemplated, in addition, that an invitation should be given to certain specified Bodies of the Church, to contribute to the expenses of this work.

Shortly after the adjournment of the Association last year, your committee, guided by the above plan, prepared a memorial to the General Convention, explaining the nature and scope of the work which it was appointed to carry on, and asking for financial assistance to an amount not exceeding $300. This Memorial was presented by the secretary of your committee to the Convention at its annual meeting in Brooklyn, last June, and was printed in the Journal of that meeting. (See page 192.) After a brief discussion, the participators in which expressed unanimous and entire approval of the proposed work, the General Convention passed the following resolution:

"*Resolved*, That the sum of three hundred dollars be contributed to-

wards the expense of publishing the scientific and philosophic writings of Swedenborg, as proposed in the memorial of the Swedenborg Scientific Association, and that the manner of contributing this sum be referred to the Committee on the Manuscripts of Swedenborg, together with the Treasurer of the Convention." (*Convention Journal,* 1901, p. 17.)

Soon afterwards, your committee reached an understanding with the Academy of the New Church, according to which that Body agreed to contribute a sum of not less than $300 for the same purpose. The Treasurer of the Swedenborg Scientific Association has already received $146.80 on account of this contribution.

In the latter part of July, a communication was addressed to the British and Foreign Swedenborg Society of London, inviting the Society to subscribe a sum equal to one-half the total cost of copying, printing and binding about 1,400 pp. of Swedenborg's Scientific MSS. (or about $800), in return for which sum it would receive one-half, or 250 sets, of the printed and bound copies. In proposing this arrangement your committee was guided by the report of Dr. Riborg Mann, who, at the third annual meeting of the Swedenborg Scientific Association, held in New York, April, 1900, reported that, acting on behalf of the Association, he had come to an understanding with the London Swedenborg Society, to the effect that that Society was willing to take one-half of any edition of Swedenborg's works issued by the Association, paying therefor one-half of the cost of publication. (*New Philosophy,* 1901, p. 101.)

Up to the time of present writing, no answer has been received from the London Society.

On November 25th, there appeared in *Morning Light* an article entitled "Swedenborg's Manuscripts." The author of this article asserted that the manuscripts described in the memorial to the General Convention had been misrepresented in that document; and, further, that all the unpublished scientific MSS. of Swedenborg were now of little if any value to the Church. The secretary of your committee prepared an answer to this article, wherein he entered into a detailed description of the manuscripts mentioned in the memorial referred to, and cited from Tafel's *Documents* the authority for the statements of the memorialists; moreover, in this answer, he entered into a thorough discussion of the general question involved, and showed at some length the necessity of preserving, by publication, the whole of Swedenborg's literary remains for use both now and in the future. The answer, after being submitted to and approved by your committee, was sent to *Morning Light,* and appeared in that journal on January 18th.

In the meantime, while the attention of the Church in America and England was thus being called to the work undertaken by the Swedenborg Scientific Association, the work itself was not neglected. Soon after its appointment your committee wrote to the Rev. J. E. Boyesen,

of Stockholm, requesting him to secure the services of a competent Latin copyist. Mr. Boyesen, however, found this to be a very difficult matter. There are numbers of professional copyists in Stockholm, but few, if any of them, are able to copy Latin MSS. Men who are able to read Latin can, more or less readily, secure positions superior to that of professional copyist, and, though they may be willing to engage in the latter occupation for a time, they will give it up as soon as they obtain more remunerative employment. It is, therefore, practically impossible to secure the continuous services of such men. The difficulty of doing this was further increased by the rules of the Academy of Sciences, which permit the manuscripts in its Library to be copied only during certain three hours of the daytime.

After diligent and long continued inquiries, and one or two discouraging disappointments, Mr. Boyesen was fortunate enough to secure the services of a lady copyist, who, after a week's trial at the work, expressed her willingness to copy all the Scientific MSS., excepting only Codex 37, being a MS. exceedingly difficult to decipher, partly by reason of the writing, and partly because of the many scientific and technical words which it contains. This lady, whom Mr. Boyesen at once engaged to work for your committee, is a Bachelor of Arts, well acquainted with Latin and fully equal to the task entrusted to her. Writing on October 15th, after the copyist had been at work a week, Mr. Boyesen says: "From what she has done I can judge that she is a good hand at it. She seemed well able to read the handwriting, and she gave evidence of good judgment in deciding the reading of badly-written or difficult words."

The charge for copying is two crowns (54 cents) per sheet of four pages, equal to about 5½ pages of the quarto manuscript. In a letter dated May 2d, Mr. Boyesen states that the manuscripts on Salt (343 MS. pp.) and Sulphur and Pyrites (329 pp.) have already been copied; and that the copying of the manuscript on the Magnet (about 390 pp.) will be finished by the end of the present month at latest. When this has been finished, the copyist will have copied over a thousand manuscript pages. The cost of this work is 445 crowns (about $120), which sum has already been transmitted to Mr. Boyesen for the copyist.

Unless other copyists can be secured during the summer, the work of copying will be discontinued at the end of May and not resumed until September 1st, as the health of the present copyist obliges her to take a vacation during the summer months.

In order to secure greater accuracy, the plan which your committee was appointed to carry out contemplated that the copy of the MSS. should be compared with the original by two competent persons other than the copyist, with appeal in difficult cases to a third person. The Rev. J. E. Boyesen has consented to be one of the collators, and the Rev. C. J. N. Manby to give his advice in the more difficult cases. But hard as it was to secure the services of a competent copyist, it was still harder to find one who was able and willing to do the work of

collation. It was not until the end of December, 1901, that Mr. Boyesen succeeded in finding such a person. At that time, however, he was able to engage the services of a Candidate of Philosophy, with honors, with whom he immediately commenced the work of collation.

But another difficulty then presented itself in the fact that Mr. Manby could not always spare the hours during which only the MSS. in the Library of the Academy of Sciences could be examined; and this so delayed the work that, at the end of February, only ten of the sixty-two sheets on Salt had been finally passed upon and sent to your committee.

Moreover, for some reason or reasons not known to your committee, the work of collation itself progressed very slowly. Although in seven months the copyist had copied over 1,000 MSS. pages, the collators in four months had compared only 343 of these pages with the copy. At the rate the copyist is working, she will produce enough copy by the beginning of next year (including time spent in vacation) to fill the two proposed volumes of 400 pages each; but, with the delay caused by the collators, the work would not be in the hands of your committee until almost the end of the year at the earliest.

In view of the above facts, your committee has approved of a plan presented to it by Mr. Asplundh, by which all the copy thus far made can be compared with the original before the copyist resumes her work and can thenceforward go on *pari passu* with the copying. The plan also contemplates the employment of another copyist during the summer, if it is possible to find one. This plan will be presented to the Board, and the committee earnestly recommends that it be accepted.

As to the cost of the entire work of copying, your committee is not at present prepared to present any definite figures. The cost of the copying itself is fixed, as stated above, at two crowns, or 54 cents a sheet, equalling about 5½ manuscript pages; and 445 crowns (about $120) has already been paid on this account. But the additional charges involved in the collation of the copy have not yet been determined upon, though about 55 crowns (about $14) has already been paid on account of work done. There has been also an additional charge of 42 crowns (about $12) for special work in copying the diagrams in the works on Salt and Sulphur. This also has been paid. Your committee feel confident, however, that the total cost of copying will not exceed the estimate made in the plan under which the work is being carried on.

In conclusion, we wish to express our appreciation of the work done by Mr. Boyesen. Mr. Boyesen has been at much trouble in securing the services of copyist and collator, and, in addition, he has taken entire charge of the work in Stockholm. We desire also to record our in-

debtedness to Mr. Manby for his work in the final revision of the copy of the manuscript on Salt.

Respectfully submitted,

FRANK SEWALL,
CARL HJ. ASPLUNDH,
ALFRED ACTON, *Sec'y*,

*Committee on the Publication of Swedenborg's Scientific MSS.*

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## COMMUNICATIONS.

### REPORT CONCERNING TRANSCRIPTION OF SEVEN OF SWEDENBORG'S PHOTOLITHOGRAPHED MANUSCRIPTS.

*Rev. E. J. E. Schreck, Secretary of the Swedenborg Scientific Association:—*

AT the request of the President of the Association, the undersigned reports that the following MSS. by Swedenborg have been transcribed from the photolithographic facsimiles:

(1.) A *poem* written by Swedenborg in 1722 at Medevi in honor of the King. (*Photolithographs,* Vol. I, p. 203. Cf. *Documents,* Vol. II, p. 879.)

(2.) A treatise, entitled *De Mechanismo animae et corporis.* (*Photolithographs,* Vol III, pp. 91-102. Cf. *Documents,* Vol. II p. 907.) This is an important work, the first of a number which have similar titles.

(3.) Some general anatomical observations, entitled *Observata,* described by Dr. R. L. Tafel, under the title *Observata in corpore humano.* (*Photolithographs,* Vol. III, pp. 142-145. Cf. *Documents,* Vol. II, p. 908.)

(4.) A fragment concerning the Infinite, entitled, by Dr. R. L. Tafel, *Fragmentum de Infinito;* he thinks that it was probably written at about the same time as the work *On the Infinite, etc.* (*Photolithographs,* Vol. III, pp. 168-173. Cf. *Documents.*)

(5.) An abstract of the universals of the *Principia,* entitled *Ex Principiis rerum naturalium meis,* described by Dr. R. L. Tafel, under the title *Epitome Principiorum Rerum Naturalium.* (*Photolithographs,* Vol. III, pp. 146-167. Cf. *Documents,* Vol. II, p. 914.) This little work properly edited would be an excellent manual of the *Principia* and might be used by new students.

(6.) A short treatise on physical and optical experiments, entitled by Dr. R. L. Tafel, *Experimenta Physica et Optica.* (*Photolithographs,* Vol. VI, pp. 102-107. Cf. *Documents,* Vol. II, p. 743.)

(7.) All that is extant of the *Worship and Love of God* that has

not yet been printed; namely, the marginal notes to Part I and the text of Part III., together with the fragments.

Respectfully submitted,

ALFRED H. STROH.

## THE PRINCIPIA CLUB OF BRYN ATHYN.

*To the Swedenborg Scientific Association:*

THE Principia Club of Bryn Athyn has continued its activity in the study of Swedenborg's scientific and philosophical works. In this connection Mr. Stroh read his review and analysis of the *Worship and Love of God,* since published in *The New Philosophy* (April, 1902). The *Miscellaneous Observations* was reviewed by Mr. Dœring, who gave a synopsis of the work and pointed out certain principles therein, which were more fully developed in Swedenborg's later philosophical works. Mr. Hyde's review of the *Ontology,* published in *Morning Light,* was read before the Club and called forth considerable discussion of the work. The opinions of all who spoke were adverse to Mr. Hyde's criticisms. The Club was also much interested in the controversy between Mr. Hyde and Mr. Acton concerning the publication of the unpublished scientific works of Swedenborg; and the articles written by both these gentlemen as well as the memorial of the Swedenborg Scientific Association to the General Convention were read before the Club.

It may also be of interest to the members of the Swedenborg Scientific Association to know that in the revision of its constitution the Principia Club of Philadelphia changed its name to the "Principia Club of Bryn Athyn," and adopted the following as its objects:

1st. "The study of science and philosophy; in particular the scientific and philosophic works of Emanuel Swedenborg, in the light of the New Church." And

2d. "To foster interest in the uses of the Swedenborg Scientific Association."

The "Principia Club" wishes that the Swedenborg Scientific Associaciation may have a prosperous meeting.

C. E. DŒRING,

*Secretary of Principia Club of Bryn Athyn.*

*Bryn Athyn,* May 27th, 1902.

## OFFICERS AND COMMITTEES FOR 1902-1903.

*President*—Rev. Frank Sewall, 1618 Riggs Place, Washington, D. C.

*Secretary*—Rev. Eugene J. E. Schreck, 4219 Ellis Avenue, Chicago, Ill.

(Minute 191, 263, 290, 295, 248.)

*Treasurer*—Mr. Carl Hj. Asplundh, Bryn Athyn, Montgomery Co., Pa.

(By-Law 3. Minute 160.)

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(Matters referred. Minute 187.)

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John R. Swanton, Ph. D.

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Rev. C. Th. Odhner, Rev. Emil Cronlund.

COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANUSCRIPTS.

Rev. Frank Sewall, Rev. Alfred Acton, Mr. Carl Hj. Asplundh.

(Reference. Minute 288.)

KEEPER OF THE ARCHIVES.

The Secretary.

(Minutes 291, 292, 322.)

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## CONSTITUTION.

### ARTICLE I—NAME.

This organization shall be called the Swedenborg Scientific Association.

### ARTICLE II—OBJECTS.

The objects of this Association shall be:

1. To preserve, translate, publish, and distribute the scientific and philosophical works of Emanuel Swedenborg.
2. To promote the principles taught in these works, having in view, likewise, their relation to the science and philosophy of the present day.

### ARTICLE III—MEMBERSHIP.

Any person desiring to co-operate in promoting the objects of this Association may become a member by written application to the Secretary and by the payment of an annual fee of one dollar; or, he may become a life member by the payment of the sum of twenty-five dollars.

### ARTICLE IV—OFFICERS.

The officers of this body shall be a President, a Secretary, a Treasurer, and a Board of Directors consisting of these officers and nine additional members, all to be elected by ballot at the annual meeting of the body. It shall be the duty of the Board of Directors to devise ways and means to carry out the objects of the Association.

### ARTICLE V—MEETINGS.

This Association shall meet annually at such time and place as the

Board of Directors shall determine. The Board of Directors shall have power to call special meetings as may be required.

ARTICLE VI—AMENDMENTS.

Any article of the Constitution of this Association may be changed on the recommendation of the Board of Directors at any annual meeting by a two-thirds vote of the members present.

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BY-LAWS.

1. Five members of the Board of Directors and a majority of the members of any Committee of this Association shall constitute a *quorum* thereof, respectively.

2. The Board of Directors and all Committees of this Association *may act* either at a meeting at which a quorum is present, or without meeting, by correspondence between the members, but in the latter case no decision shall be arrived at without the acquiescence of a majority of the members of the Board of Directors, or Committee, as the case may be, communicated in writing to the Chairman of such Board or Committee.

3. The *annual dues* of each member shall become payable on the first day of the month following his reception as a member and annually thereafter. [A resolution adopted at the Third Annual Meeting (minute 160) provides that after having failed to pay his dues for two years, and after having been duly notified, a member shall be considered to have *resigned* from the Association.]

4. These By-Laws or any of them may be *amended* at any time by a majority vote of the Board of Directors.

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## LIST OF MEMBERS OF THE SWEDENBORG SCIENTIFIC ASSOCIATION.

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Acton, Rev. Prof. Alfred, Huntingdon Valley, Pa.
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## EDITORIAL NOTE.

THIS being the first issue of *The New Philosophy* under editorship of the writer, it may be well for him to say something of the thoughts with which he enters upon the conduct of it.

As organ of the Swedenborg Scientific Association, *The New Philosophy* is bound to concern itself primarily with the early writings and early philosophy of Swedenborg. Along with the Association, it is therefore firstly concerned in helping along the publication of translations of Swedenborg's early treatises, and the editor believes that as much space in *The New Philosophy* as possible should be given up to such translations.

Our next important duty is the study and reconstruction of the system of philosophy contained in Swedenborg's early works. Articles in which this task is undertaken need not, in fact, should not, assume the truth of the philosophy they are attempting to elucidate. Their function is to present that philosophy, or a part of it, in its true colors, from which the reader may draw his own conclusions. The truth or the error in Swedenborg cannot be altered by anyone's assertions, but proper investigations ought to make both apparent, after which all that we are called upon to do in approaching fair-minded persons,—the only ones to whom it is worth while to appeal,—is to properly present the course and the results of those investigations. It is to be hoped that all such articles will conform to this ideal.

Still more careful must be the worker who endeavors, not merely to interpret Swedenborg's philosophy "as such," but to show that the principles he handled and named conform to nature; that they are not merely his, but that they are true. The editor intends to insist that articles of this kind prove their positions by what would be recognized by any fair-minded scholar as legitimate arguments. It must be

remembered that a reference to Swedenborg's theological writings is no proof to the general public of the absolute truth of anything in his earlier works. He who believes in the absolute truth of Swedenborg's later writings will, of course, accept that in his earlier ones, which is demonstrated to agree with them as absolutely true, but this is a matter of individual opinion.

Much labor is wasted every day in argumentative work, because the argument is not thorough. By this I mean that the writer in treating his subject does not exhaust all of the possibilities of the case. Thus there may be four possible explanations of a phenomenon—A, B, C and D. I may believe that theory A contains the true explanation, but I must not expect to convince any other person that I am right until I have gone through with theories B, C and D in detail. This, impulsive and enthusiastic natures always find difficult, but it is the only sure way to carry conviction. An argument which excludes from consideration all but one theory, however brilliantly handled, always leaves that fatal doubt lurking in the mind which prevents complete acceptance of the writer's view. Students of both kinds may cite facts, but with one a single theory precedes and facts follow, dragged along, as it were, in the wake. They are introduced to prove a proposition already determined upon. The other is apt first of all to throw forward an army of facts bearing on the question at issue, then to call attention to the number of theories which may be devised to account for them and those facts which appear to support each. Now, when each theory has been fully discussed, it seems as though it were the reader himself who reached the conclusion. This second method of inquiry is the distinctively scientific one, and it is that which is being used more and more in every department of research. That it is not always fairly or effectively employed, and that it does not always give true results, is not the fault of the system, but of the way in which it is handled.

It is most regrettable that more writers upon Swedenborg have not been willing to employ such a method of approach. No one who really believes in the truth of a principle has the least hesitancy in testing it, for hesitancy implies doubt. A mind of this sort is *per se* unwilling to make truth its chief aim, and coddles inherited or adopted principles, just as a selfish man may love his children, simply because he sees himself reflected in them. But outer nature serves as a plumb-line by which we can readjust our own imperfect constructions and eliminate those individual aberrations which tend to make them fall further and further "out of true."

Because I believe in the substantial truth of the main principles set forth in Swedenborg's works, I am perfectly willing to have them discussed freely. I should be inclined to regard an unwillingness to subject them to an unbiased examination as a slur cast upon them, all the more to their disparagement because unacknowledged.

# THE NEW PHILOSOPHY.

VOL. V. OCTOBER, 1902. No. 4.

## THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM.

BY EMANUEL SWEDENBORG.

### CHAPTER IV.

(*Continued.*)

82. 6. *The kinds of changes of state in the sensory of smell.* 1. Changes of state arise from these causes, thus diversely in each object. 2. Changes of state from these causes are induced upon the cortical substance itself; these are its more common changes; those of taste are still more common, and those of touch are the most common; all these changes the soul sensates distinctly, for she is everywhere. 3. Similar changes of state are induced upon the whole brain, that is to say, upon its two substances, wherefore upon both hemispheres of its globe, especially by touch and taste, and by smell. 4. Similar changes of state return immediately into the organ, and into every single papilla of it, which papilla then expands itself, or retracts, or hardens, or softens, or becomes inflamed, grows warm, grows cold, trembles, and more or less lives. 5. A like change is induced upon its glandules, upon the pituitary membrane, upon the arteries, upon the veins; thus all things arrange themselves according to affections, desires, appetites, pleasures. 6. Most happy is he who suffers himself to be urged, so far as may be, by the soul, while the soul is urged by the superior mind. 7.

A like state is unduced upon every muscle of the face, wherfore upon the countenance. 8. But the change of state of the whole organ or the nose, which is the common sensory, is not of such a kind and is brought about by means of the muscles, because it either opens the nasal apertures or closes them, draws either little or much of the atmosphere, slowly or swiftly, either removes itself from a place, or brings itself to a place; either comes thither or flees thence, either holds the nose with the fingers, or with the hands brings up such things as are grateful, and it procures those things for itself from the vegetable kingdom and elsewhere, etc. 9. Thus there are changes of state proper to the nose, and these are artificial by various means.

**83.** 7. *As to effects.* 1. Not only is the organ itself changed as to its state according to causes of appetite, 2, but also all those things are changed which conspire, as the trachea and the lungs. 3. The veins themselves, which draw in aerial aliment, take upon themselves similar states; they open or close, thus they seek or turn away from a thing; in the same manner as the brain so does the fibre, for a like affection returns into the fibre. 4. A similar change of state sometimes occupies the cuticles, which excite a similar cause, and snatch up atmospheric foods. 5. Therefore the state of the animal microcosm imitates the state of the macrocosm, in that now it opened and admits into itself effluvia and vapors, now indeed rejects them, yea, sometimes not by insensible perspiration, but by sweats. 6. Thus the whole corresponds, the cause of which is sensation; and thence arises affections, and thence appetite. 7. But it is the cerebellum, which induces these states, not indeed the cerebrum; this latter sensates the affection.

**84.** 8. *As to the second use, or the excitation of the brain by the sense of smell,* from the things said it becomes evident, 1. that that sense, as also taste, instructs us but little as to what agrees or disagrees with the body. 2. It instructs the soul, indeed, especially the soul of the cerebellum, but its affection does not come to the cognizance of the rational mind, because it is not instructed by the soul, but it is only a pleasure which persuades. 3. Wherefore it can be present or absent. 4. From these things it follows that the use of knowing those

things which agree with the blood is not the primary use in the human kind, but is the primary use in brutes, which are ruled by instinct or the nature of the soul. 5. Wherefore the primary use in the human kind is that the brain may be excited and exhilarated by the sense of smell. 6. The soul in the cerebellum sensates those contacts, although no sense reaches to the cerebrum.

85. *How this nasal sense very greatly excites the brain, and restores the body, sometimes in an instant.* 1. This may appear from certain medicines which with stupendous swiftness induce changes; [such a medicine] relieves headaches, removes pains, heals deafness itself, and blindness arising from causes in the brain, and cures many morbid indispositions arising from the brain, as I have seen in the practice of Dr. Walth of London, by only drawing a subtile spirit through the nostrils; and as it thus heals, so also it kills and perverts, as in mines and wells, (of which the histories are extant), by inhaling poisonous and toxic effluvia, and many other things. 2. This is because the nose is the very ultimate centre of the skull, of the brain, of its meninges, of the fibres, of the cortex, of the convolutions, in order that from that focus it may run through every part, even to the cortical beginnings, whence the whole force returns into all the peripheries and into the body. 3. For the sense of smell is not simple, but double; smell is conjoined with a subtle sensation of touch. 4. From both is brought about the effect of contraction, expansion and modification, which traverses the whole superior region and its parts; and indeed extends to beginnings and arises from beginnings, therefore it is not a palliative cure. 5. The sense of touch instantly pervades the mucous membrane, which, because it is thickly sown with so many fibres of the olfactory nerves, penetrates from so great an expansion and by the network of its membrane into the dura mater; 6, and because it is bound to the turbinated bones, which are formed and rolled altogether according to the nature of its modification, it penetrates into every part of the cranium, into the neighboring bones, (concerning which see Heisterus), into all the sinuses, which are invested with the same membrane, into the folds, into all things which depend upon the dura mater within the cranium, and by this way into every part of the

brain. 7. Then also it penetrates into the pia mater, which thing also at the same time a certain sense or more subtle modification, or smell, perceives, wherefore it reaches all the divisions of the brain in general and in particular, even to every surface of the cortical part and to every division of the medullary part, so that nothing is left untouched. 8. Likewise by the fibres it penetrates into the mammillary processes, which subtend the brain, and are inrooted in the whole medullary substance and are terminated in the cortex itself, for the sense runs through every contiguous part, and the more perfectly when its parts are thus arranged according to every form of modification as in the brain. 9. For the modification or sensation of one or of some of the papillæ goes immediately to the whole subtending membrane as into its own general receptacle, and thus with increased strength to the whole medullary and cortical substance. 10. The modification likewise also proceeds by the arterial or sanguineous way, for according to Winslow the external carotids communicate with the internal, and the internal with the external in this place; so also the veins. 11. If also anything passes through which produces or foments the spirit through the corporeal fibres there arising even to the cortex, the more certain is the effect thence. 12. The effect returns into the beginnings themselves, into the fibres themselves, into the spirit, into the blood, into the beginnings, into the vital liquors, wherefore into all things of the whole body from the beginnings. 13. Similarly also to the cerebellum by the fibres of the nerves of the fifth pair; 14, to the eye, the ear, (more immediately, because they obstruct from the side), with which there is communication proximately by an external way; finally into the optic nerves by an internal way. 15. Likewise also immediately into the lungs, their fibres, vessels, spirit and blood; the lungs are the principles of life in the body,—they are succenturiate to the brains. Hence is evident what is the effect of this double sensation in the nostrils. 16. Further that it excites the affections themselves of every faculty; and of the soul from the mind, whence is confidence, which also contributes.

86. *Why of necessity by the sense of smell the brain is excited, in brutes and in man.* 1. In brutes in order that they

may know the nature of their nourishment, nature dictating, for their science is natural, not adscititious and artificial; wherefore it is by the instinct of the soul. 2. And in order that, as in man, they may excite into new life and may be continually revived by their own herbs; for they know from nature what is useful for eating and what for exciting, and they are from nature skillful as to medicine for their body. 3. Wherefore with them senses of this kind are more perfect, the olfactory processes are larger, thinner, more tumid, more deeply inrooted in the medullary substances, more perfectly communicating all things with the beginnings. 4. Then also with the lungs—wherefore they draw breath more deeply even to the flanks, while with the nostrils they gape for food, especially when appetite is present. 5. In man, however, this sense is more for the sake of excitation, for thence all things are vivified, and by affections exhilarated. 6. In order that man may know what is in the atmosphere, wherefore what floats in the hidden parts of it. 7. What thence is from a distance. 8. In order that he may perceive the wonderful things of God from amenities, and may enjoy a delightful life. 9. But he does not know these things *ex priori,* but from effect, whether they agree with his nature, even odors most fragrant and most delightful. 10. And on the other hand, in order that he may be able to shun, abhor, and not admit things contrary to his nature, and by preservative things injected into his nostrils may repel, break them up, etc. 11. Man has less acuteness as to this sensation, and that which disturbs his analyses, induces varieties upon his faculty of thinking, thus it disturbs his proper endowment; for smell especially effects this, for thought requires a quiet state of the cortex. 12. For if we attend well to deep thoughts, when we draw breath, then an abundance of ideas from the lower part rush into the sphere of the thought, as if then, the gate being open, the attacking army rushes in; but when we hold the breath and expire slowly so long we may remain deeply in the tenor of our thought, and we as it were communicate with our superior faculty or with our soul. This I have very often observed in myself. Holding the breath is having intercourse with the soul, but drawing it is having intercourse with the body. Reason also admits this, for as often as there is drawn

into the cortical substance itself the blood or the coarser spirit of the blood and from the body, and that substance comes into another state, in which state the sense is altogether corporeal; 13. wherefore, also we do not smell, except during inspiration, but not during expiration, as is known. 14. This also is the reason why it is given to man to breath through the palate thus by a shortened way, lest anything interrupt the analyses of his rational mind. 15. In infants and others who live in the body, we notice full, not slow, inspirations. 16. The same is confirmed by the ecstatic phenomena of certain persons; while they are in these states they are in intercourse with their soul and with its nature. 17. Wherefore the lungs and their respirations are the things which (establish) the corporeal life and the motor and sensitive life of the body, and join the soul to the body, so that we are able to act *ex posteriori* when the machine is reversed, according to those things which have been said in Part II. of the Animal Kingdom. 18. Wherefore to man are given thin mamillary processes; for they are almost alone for the sake of the pleasure and excitation of the corporeal life. 19. In the human race this sense is sometimes wanting, without any diminution of life.

87. *From these things it appears how the rational mind which is the proprium of man, takes away instinct such as is in brutes.* 1. In brutes there is no rational mind and will thence, but a blind leading of nature, or instinct, as is known. 2. There are with brutes senses, which immediately communicate the effects of the body and the world with their soul, whence their instincts are called forth; thus they as it were do nothing from themselves, but from nature. 3. Therefore all things tend from ultimates to firsts, where knowledge resides; from this arises the affection, according to which they act. 4. But in man there is another principle, or the rational mind; to him are given senses in order that that mind may be instructed, 5, and in order that the soul may inflow into the mind, or in order that we may arrive at the communication of mind by our mind; for the more that is cultivated, the more fully does communication take place, if only we proceed rightly, and have a desire for those truths. 6. Thus our rational mind is that which takes away instinct, and according to its culture the mind obtains

culture for itself. 7. And this is in order that we may live not under nature, but under the influx of the supreme mind or spirit of God. 8. This is the end, why we are born most infantile and ignorant, namely, in order that thus we may be associated with the supreme being, which can never be done in the case of brutes. 9. But as to these things they are to be found in Psychological treatises; for we ought to distinctly comprehend those faculties, and indeed according to the doctrines of order and degrees, of influxes, of forms, etc.

88. 9. *How the drawing of the breath not only nourishes the blood, but also the spirit itself, and brings certain atmospheric elements even to the cortex of the brain.* 1. This is especially done in the lungs, for thither come the purest elements, for the air is purified on the way, according to those things in Part II., concerning the Lungs. 2. Thence is the renascence of the blood, its splendor, and its preparation, and change into arterial blood. 3. Something similar occurs in the nasal crypts, which inspect, as does the tongue, and absorb the purer things, which flow to it; 4, therefore there is a various communication with the external and internal Carotids. 5. The corporeal fibres are what bring forward; 6, the excitation itself of the brain and its sudden refection persuades it, of which above; 7, in the meantime the same thing as that mentioned concerning the cuticles occurs here, for this is very thin, of the same nature, and furnishes with a double sense, thus still more than the common cuticle. In this cuticle there is a more perfect sensible perspiration. 8. Hence in the nares the construction persuades so many arterial and venous vessels, so many glandules, so many nervous fibres. 9. We do not know what is done in the smallest forms; all of them have porosity and permeability; this is known from the effect alone.

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". . . They have spiritual light, who love to understand whether that be true which is said by another, but . . . they have natural light, who only love to confirm what hath been said by others." *Swedenborg*, Div. Wis., I.

## SWEDENBORG'S THEORY OF FIRE.[1]

THE history of scientific research contains few pages so interesting and instructive as those which describe the progress of theories concerning the nature of fire, flame, combustion, and related subjects. One theory has followed another, terminology has been so changed that the works of the older toilers in the field require to be most carefully studied if their statements are to be at all comprehended, and any one branch of the subject must be viewed in its proper historical perspective and with a proper regard for the changes in methods of research and in terminology which have taken place in a given period, if it is to be seen in its true proportions.

Let us now proceed to investigate Swedenborg's theory of fire in this way; and in order that a background may be furnished let us take a brief survey of the history of the discoveries and theories concerning fire.

The ancient division of nature into the four elements, fire, air, water, and earth, is true in a very general sense; and the important position held by fire in the ancient philosophies undoubtedly had its origin in a knowledge of the correspondence of the sun and fire. But it appears that but little was known of the nature of fire in the modern experimental sense, and during the days of alchemy and scholasticism endless confusion was introduced by a misunderstanding of the differences between gases and the phenomena of flame and combustion. One of the early experiments which was of the kind which long after led to the important deductions of Lavoisier, is contained in the works of Jean Baptiste Van Helmont (1577-1644). He says:

But the flame itself, which is nothing but a kindled smoke, being enclosed in a glass in the very instant perisheth into nothing.

The flame indeed is the kindled and enlightened smoke of a fat exhalation; be it so; but as the flame is such and true fire and not another matter, being kindled and not yet kindled, neither doth it differ from

[1] This article is an abridgment of a paper read in part at the Regular Meeting of the Principia Club of Bryn Athyn, Pa., May 20, and concluded at a special meeting held June 12, 1901.

itself; but that light being united in its centre, hath come upon a fat exhalation which is the same as to be inflamed.

Let two candles be placed which have first burned awhile, one indeed being lower than the other by a span; but let the other be of a little crooked situation; then let the flame of the lower candle be blown out; whose smoke, as soon as it shall touch the flame of the upper candle, behold the ascending smoke is enlightened, is burnt up into a smoky or sooty gas, and the flame descendeth by the smoke even unto the smoking candle. Surely there is there, the producing of a new being, to wit, of fire, of a flame, or of a connexed light; yet there is not a procreation of some new matter or substance.

For the fire is a positive artificial death, but not a privative one, being more than an accident and less than a substance.[2]

It appears then that Van Helmont thought flame to be a burning smoke, not a new substance, but the incandescence of a vapor or smoke that already existed.

Robert Hooke (1635-1703)—

—Speaks of that transient shining body which we call flame as nothing but a mixture of air and volatile sulphureous parts of dissoluble or combustible bodies which are acting upon each other whilst they ascend, an action so violent, he says, "that it imparts such a motion or pulse to the diaphanous parts of the air" as was requisite to produce light.[2]

Robert Boyle (1626-1691), in his *Memoirs for a General History of the Air,* in his *Suspicions about some hidden qualities of the Air,* in his *Skeptical Chymist,* and elsewhere, describes many experiments on air, fire and flame which show that he came very near making the conclusions afterwards made by Lavoisier. He noticed that substances grow heavier by calcination, that there is a direct relation between air and flame, that animals cannot live in an air vacuum, that fire burns better in compressed than in ordinary air, and that the contact of phosphorus and air seems to "mortify" the former.

Compare the following quotations with the theory of finites and actives given by Swedenborg, and with the best results of modern chemistry:

If it be true, which was the opinion of *Leucippus, Democritus,* and other prime anatomists of old, and is in our days revived by no mean

[2] Quoted from a lecture by Prof. Arthur Smithells, in *Nature,* 1893, pp. 86-92.

philosophers; namely, that our culinary fire, such as chymists use, consists of swarms of little bodies swiftly moving, which by their smallness and motion are able to permeate the solidest and compactest bodies, and even glass itself; if this (I say) be true, since we see, that in flints and other concretes, the fiery part is incorporated with the grosser, it will not be irrational to conjecture that multitudes of these fiery corpuscles, getting in at the pores of the glass, may associate themselves with the pores of the mixed body whereon they work, and with them constitute new kinds of compound bodies, according as the shape, size, and other affections of the parts of the dissipated body happen to dispose them, in reference to such combinations; of which also there may be the greater number, if it be likewise granted, that the corpuscles of the fire, though all exceeding minute, and very swiftly moved, are not all of the same bigness, nor figure: and if I had not weightier considerations to discourse to you of, I could name to you, to countenance what I have newly said, some particular experiments, by which I have been induced to think that the particles of an open fire working upon some bodies may really associate themselves therewith, and add to the quantity.[3]

Fire, which is the hottest body we know, consists of parts so vehemently agitated, that they perpetually and swiftly fly abroad in swarms, and dissipate or shatter all the combustible bodies they meet with in their way; fire making so fierce a dissolution, and great a dispersion of its own fuel, that we may see whole piles of solid wood (weighing perhaps many hundred pounds) so dissipated, in a very few hours, into flame and smoke, that oftentimes there will not be one pound of ashes remaining.[4]

Ramsay has truly said of Boyle that he "was one of the most distinguished scientific men of his own, or indeed of any age, and in his spirit of calm philosophical enquiry he was far in advance of his contemporaries." [5]

John Mayow (1645-1679), made experiments on air and metals and came to the conclusion that there were at least two kinds of gases in air, one of which, consisting of nitro-aerial particles, supporting life and the combustion of inflammable bodies, the other capable of supporting neither. He noticed that antimony gains in weight when set on fire by a lens and

[3] *The Works of the Honourable Robert Boyle in Six Volumes.* London, MDCCLXXII. Vol. I., pp. 523-4; cf. p. 527.
[4] *Op. cit.*, Vol. IV., p. 245. *On the Mechanical Origin of Heat and Cold.*
[5] *The Gases of the Atmosphere*, by William Ramsay; Macmillan & Co., 1896; p. 7.

burnt, and ascribed this gain in weight to the nitro-aerial particles and to the fire. Mayow made many other experiments,[6] but he was overshadowed by the fame of Boyle and Newton. Boyle appears to have read Mayow, but curiously enough "does not appear to have been favorably impressed by his conclusions." [7]

Of Jean Rey, Ramsay says:

Before leaving the seventeenth century, it is perhaps fitting to mention the name of Jean Rey, a French physician, who wrote in 1630 concerning the gain in weight of tin and lead when calcined. While Rey exhibited some leaning towards the modern methods of experimentation, he still lay fettered in the bonds of mediæval scholasticism. In discussing the weight of air and fire, he finds occasion to consider the question whether a vacuum can exist. His words are so quaint that they are worth quoting: "It is quite certain that in the bounds of Nature a vacuum, which is nothing, can find no place. There is no power in Nature from which nothing could have made the universe, and none which could reduce the universe to nothing: that requires the same virtue. Now, the matter would be otherwise if there could be a vacuum. For if it could be here, it could also be there; and being here and there, why not elsewhere? and why not everywhere? Thus the universe could reach annihilation by its own forces; but to Him alone who could make it is the glory of being able to compass its destruction." And since air cannot be drawn down by a vacuum, it must descend by virtue of its own weight when it fills a hole. And hence, as air has weight, tin and lead gain in weight when they combine with air. It will be admitted that this is very inferior to the speculations and deductions of Boyle and Mayow.[8]

Stephen Hales (1677-1761), a country clergyman who was interested in botany, in order to understand the growth and development of plants made experiments on air. His methods were quite modern, for in his introduction he says:

And since we are assured that the all-wise Creator has observed the most exact proportions of *number, weight* and *measure* in the make of all things, the most likely way, therefore, to get any insight into the nature of those parts of the creation which come within our observation

[6] The title of Mayow's work is: *Tractatus quinque medico-physici, quorum primus agit de sal-nitro et spiritu nitreo-æreo; secundus, de respiratione; tertius, de respiratione fœtus in utero et ovo; quartus, de motu musculari, et spiritibus animalibus; ultimus, de rhachitide;* studio Joh. Mayow, LL. D. and Medici, nec non Coll. Omn. Anim. in Univ. Oxon. Socii. Oxonii e Theatro Sheldoniano, An. Dom. MDCLXXIV.

[7] For an account of Mayow's work see Ramsay, *op. cit.*, pp. 15-28.

[8] Ramsay, *op cit.*, pp. 27-8.

must in all reason be to number, weigh, and measure. And we have much encouragement to pursue this method of searching into the nature of things, from the great success which has attended any attempts of this kind. For God has "comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance." [9]

Hales made experiments on a variety of substances, subjecting them to distillation and fermentation and collecting their "airs" over water. He used hog's blood, tallow, a fallow deer's horn, oyster-shell, oak, wheat, peas, amber, tobacco, camphor, aniseed oil, honey, beeswax, sugar, Newcastle coal, earth, chalk, pyrites, a mixture of salt and bone-ash, of nitre and bone-ash, tartar, compound aqua-fortis; grain, raisins and other fruits; he also generated "air" by the action of acids on metals. But, although he was aware of the work of Boyle and Mayow, and quotes them, he did not come to the conclusion that the "airs" which he produced were different, but thought that they were but modifications of an elastic "*Proteus* among the chymical principles." [10] How near he was to the truth may be seen from his conclusions as presented in the following extract:

The air is very instrumental in the production and growth of animals and vegetables, both by invigorating their several juices while in an elastick, active state, and also by greatly contributing in a fix'd state to the union and firm connection of several constituent parts of those bodies, viz., their water, salt, sulphur, and earth. This band of union, in conjunction with the external air, is also a very powerful agent in the dissolution and corruption of the same bodies; for it makes one in every fermenting mixture; the action and re-action of the aerial and sulphureous particles is, in many fermenting mixtures, so great as to excite a burning heat, and in others a sudden flame; and it is, we see, by the like action and re-action of the same principles, in fuel and the ambient air, that common culinary fires are produced and maintained.[11]

[9] Ramsay, *op. cit.*, pp. 29-30. The title of Hales' chief work is: *Statical Essays, containing Vegetable Staticks; or an account of Statical Experiments on the Sap in Vegetables, being an Essay towards a Natural History of vegetation: of use to those who are curious in the Culture and Improvement of Gardening, etc.: Also, a specimen of an attempt to analyse the air by a great Variety of Chymiostatical Experiments, which were read at several meetings before the Royal Society.* By Stephen Hales, D. D., F. R. S., Rector of Farringdon, Hampshire, and Minister of Teddington, Middlesex.

[10] Ramsay, *op. cit.*, p. 37.

[11] Quoted from Ramsay, *op. cit.*, p. 35.

From what is known today it is clear that Hales produced "mixtures of hydro-carbons, carbon dioxide, probably sulphur dioxide, hydrochloric acid and ammonia (both, however, dissolving in water as they were formed), oxides of nitrogen, possibly chlorine," [12] oxygen and hydrogen.

Lack of time will permit only a reference at this point to the important discoveries of "fixed air" (carbon dioxide), by Joseph Black (1728-1799), and of "mephitic air" (nitrogen), by Black's pupil, Daniel Rutherford (1749-1819).

The experimenters on the nature of fire and air were much hampered by the theory of phlogiston, which is an excellent example of how the most carefully made experiments may lose their proper meaning to minds dominated by prejudice. It took the critical, revolutionary genius of Lavoisier to overthrow this bugbear.

Van Helmont's gaseous principles—

—Apparently suggested to his successors, Becher and Stahl, the notion of a principle inherent in every combustible substance, which was lost during combustion. The development of this—the phlogistic—theory is almost wholly due to the latter chemist, and indeed it is difficult to trace Becher's share in it.

The fundamental conception of this doctrine is that all combustible bodies are compounds. During combustion one of these constituents, common to all, was dissipated and escaped, while the other, sometimes an acid, sometimes an earthy powder or calx, remained behind. Thus sulphur and phosphorus, when burnt, give acids; and the metals form *calces*. Non-combustible substances, such as lime, were imagined to be *calces*, and it was supposed that if phlogiston were restored to them, they too would be converted into metals. This combustible principle was thought to be inherent in all combustible bodies whatsoever; it corresponds in kind with the "sulphur" of more ancient writers, but differs from the latter inasmuch as no very precise ideas were entertained of the identity of the "sulphur" which conferred on the substances containing it as a constituent, or possessing it as a property, their power of combustion. It was also made more definite by Stahl that substances capable of burning or conversion into calces are compounds containing phlogiston in combination with other substances.

Stahl can hardly be credited with more than the invention of the term "phlogiston," and with bringing the subject in a clear and definite form before his contemporaries. For Stahl wrote in 1720; and we find Mayow, in 1674, entering into an elaborate argument to prove that

[12] *Ibid.*, p. 31.

sulphuric acid is not contained in sulphur, but that it is produced by the union of the sulphur with his fire-air particles. But Stahl amplified the doctrine which Mayow had controverted, in pointing out that if such substances as phosphorus, sulphur, or metals are heated, they burn, and are changed into phosphoric acid, sulphuric acid, or "calces;" and reciprocally, if phosphoric acid, sulphuric acid, or a calx such as that of tin or lead, is heated with matter rich in phlogiston, such as charcoal, pitcoal, sugar, flour, etc., phlogiston is restored to the burnt substance, and the original material, phosphorus, sulphur, tin, or lead, is reproduced. The idea at once captivated the minds of the chemists of that age, who received it with approbation, and devised experiments designed to extend the applications of the theory and to confirm its truth.

Substances were not supposed always to be completely deprived of phlogiston by combustion. Indeed, if the phlogiston were removed wholly, or nearly so, it was by no means easy to restore it. Thus the calx of zinc, or of iron, which was regarded as nearly devoid of phlogiston, is difficult to reduce to the metallic state by ignition with substances rich in phlogiston, such as coal or charcoal. The addition of phlogiston alters the appearance of the substance as regards colour or metallic lustre, and these vary according to the proportion of phlogiston present.

There existed no very definite idea regarding the appearance or properties of phlogiston itself. Becher's name for it was *terra pinguis* and it was represented by Becher and by Stahl as a dry substance of an earthy nature, consisting of very fine particles, which were capable of being set into violent motion; this idea was derived partly from the fact that combustion is usually accompanied by flame, which was supposed to be produced by the motion of the particles of the body, communicated to it by the phlogiston.

It must not be forgotten that at this time it was perfectly well-known that metals gain weight on calcination. Jean Rey was quite aware of this, and Boyle relates an experiment to show that tin gains weight when converted into calx; and it will be remembered that Mayow made experiments on the ignition of antimony by the aid of a burning-glass, and rightly conjectured that the substance produced was the same as that formed by treating it with nitric acid, and subsequent ignition. Boyle's view was that calx of tin was a compound of *tin* and *heat;* Mayow's more correct view was that calx of antimony was a compound of *antimony* and *fire-air*. But in spite of these well-proved facts, the adherents of the theory of phlogiston ignored them, and it does not appear to have occurred to Becher or to Stahl that they were inconsistent with their theories.

When this difficulty was stated, which was not until a much later date, a lame explanation of a metaphysical nature, and in itself contradictory, was all that could be offered. It was that phlogiston is endowed with the contrary of gravity or weight, i. e., levity or absolute

lightness. This means, of course, that it is repelled by the earth. But if repelled by matter, how comes it that it enters into combination with matter? For it could not remain united if its property were to repel and not to attract. Notwithstanding this, however, the idea satisfied some as to the gain in weight which metals undergo in changing into calces.[13]

The theory of phlogiston, which dominated the chemistry of the eighteenth century and much retarded its progress, was destroyed by Lavoisier, who made use of the experiments of his contemporaries and convinced the scientific world of the new century of the truth of the doctrines which obtain today. This phase of our subject will now be considered.

Joseph Priestley (1733-1804), a theological controversialist,—the same who was engaged in controversy with Robert Hindmarsh,—vigorously prosecuted experiments on the nature of air and fire. He repeated Mayow's experiments of preparing nitric oxide by the action of nitric acid on iron, and investigated various kinds of airs, among which was gaseous hydrogen chloride. He thus acquired the idea that there were various kinds of "airs." He had previously concluded that—

—Atmospheric air is not an unalterable thing, for that the phlogiston with which it becomes loaded from bodies burning in it, and animals breathing in it, and various other chemical processes, so far alters and depraves it as to render it altogether unfit for inflammation, respiration, and other purposes to which it is subservient; and I had discovered that agitation in water, the process of vegetation, and probably other natural processes, by taking out the superfluous phlogiston, restore it to its natural purity. But I own that I had no idea of the possibility of going any farther in this way, and thereby procuring air purer than the best common air.[14]

In August, 1774, Priestley heated red oxide of mercury by means of a burning glass, and produced an air in which a candle burned brightly, and red-hot wood sparkled. He mixed nitric oxide with his new air and was surprised to find—

—That even after addition of nitric oxide and agitation with water, the residue still supported the combustion of a candle. A mouse, too, lived half an hour in the new air, and revived after being removed; whereas similar experiments with an equal volume of common air had

[13] Ramsay, *op. cit.*, pp. 40-4.
[14] Quoted from Ramsay, *op. cit.*, p. 76.

shown that, after respiring it for a quarter of an hour, a mouse was indisputable dead.[15]

He also produced similar air from "flowers of zinc" (zinc oxide), chalk, slaked lime, and other substances by distillation with nitric acid, which was "better" than common air and he called it "dephlogisticated" air.

Priestley had the curiosity to breathe his "good" air. He says: "My reader will not wonder that, after having ascertained the superior goodness of dephlogisticated air by mice living in it, and the other tests above mentioned, I should have the curiosity to taste it myself. I have gratified that curiosity by breathing it, drawing it through a glass syphon, and by this means I reduced a large jar full of it to the standard of common air. The feeling of it to my lungs was not sensibly different from that of common air, but I fancied that my breast felt peculiarly light and easy for some time afterwards. Who can tell but that in time this pure air may became a fashionable article in luxury? Hitherto only two mice and myself have had the privilege of breathing it.[16]

Carl Wilhelm Scheele (1742-1786), a Swedish chemist, made the discovery of oxygen gas two years before Priestley, as has been shown from his laboratory notes recently published by Baron Nordenskjold; but Priestley was prior in publication by a year. From Scheele's laboratory notes "it appears that before 1773 he had obtained oxygen by the ignition of silver carbonate, red mercuric oxide, nitre, magnesium nitrate, and from a mixture of arsenic acid and manganese dioxide." [17] Scheele discovered chlorine, and made a variety of interesting experiments, actually "reproducing Mayow's name 'fire-air particles' for the same substance of which Mayow had inferred the existence a century before, and which he had pointed out as being present in the acid of nitre, as well as in common air." [18]

Henry Cavendish (1731-1810), by his experiments on the constituents of air, in which he dealt with oxygen, nitrogen and carbon dioxide, was finally led to the discovery of the constituents of water by the composition of "dephlogisticated air"

[15] Ramsay, *op. cit.*, p. 78.
[16] Ramsay, *op. cit.*, pp. 81-2.
[17] *Ibid.*, p. 85.
[18] *Ibid.*, p. 94.

procured from red precipitate and "inflammable air," or hydrogen; thus drawing attention to the important part played by hydrogen in the phenomena of combustion. The series of experiments made by Cavendish are in the highest degree interesting, but lack of time forbids a recital of them.

Antoine Laurent Lavoisier (1743-1794), one of the greatest chemists of all ages, a man of the most versatile genius, brought to a climax the wonderful chemistry of the eighteenth century. In 1772 Lavoisier noticed that sulphur and phosphorus when oxidized gain in weight, and he communicated his discovery to the Secretary of the Academy, in a sealed note, which was to remain secret until the publication of his experiments. In 1774 he met Priestley, learned of his experiments, and shortly afterwards verified them. He calcined tin in hermetically-sealed retorts and observed the increase in weight of the calx, concluding that calx of tin is a compound of tin and air. In a paper, communicated to the Academy in 1775 and published in 1778, entitled "On the Nature of the Principle which combines with Metals during their Calcination, and which increases their Weight"—

—He describes experiments showing that when metallic calces are converted into metals by heating with charcoal, a quantity of fixed air is expelled; and here for the first time he points out that *fixed air is a combination of carbon with the elastic fluid contained in the calx.*[19]

The result of Lavoisier's experiments was that—

—He accounted for the phenomena of combustion without having recourse to the phlogistic hypothesis: the calx was produced by the union of the metal with the active constituent of air; and when carbonaceous material burned, the carbon united with this same constituent, producing fixed air. But there were still difficulties in his way: it was known that in dissolving metals in dilute vitriol or muriatic acid, a combustible and very light air was evolved; and that the metals were thereby converted into calces in combination with the respective acids. This fact was not explained even by the supporters of the phlogistic theory, but it had the effect of preventing them from accepting Lavoisier's views. Some considered that hydrogen and phlogiston were identical, and that on dissolving a metal the calx was formed by the escape of the phlogiston; while others had a hazy idea that hydrogen was a compound of water and phlogiston. . .

Lavoisier's objection to such a theory was that the calx was *heavier*

[19] Ramsay, *op. cit.*, p. 106.

*than the metal,* and that hydrogen, though light, still possessed weight. Moreover, he had ascertained that the calces of mercury, tin, and lead are compounds of these metals with active air, and that as fixed air is produced by heating such calces with carbon, fixed air must be a compound of carbon and vital air, or, as he named it, the "oxygine principle," inasmuch as its combination with phosphorus, sulphur, and carbon resulted in the formation of acids.[20]

Lavoisier also experimented with iron pyrites, and in 1783, hearing of the experimental results of Cavendish, he at once perceived their meaning in relation to the theory of phlogiston. He repeated the experiments of Cavendish, producing water, and in addition "performed the converse operation in decomposing steam by passing it over iron wire heated to redness in a porcelain tube." [21]

Lavoisier now possessed experimental data proving that the solution of metals in acids depended upon the decomposition of water, and the day for the new chemistry was won. Mendeléeff, in his *Principles of Chemistry,*[22] sums up the case as follows:

An Englishman, named Mayow, who lived a whole century before Lavoisier (in 1666), understood certain phenomena of oxidation in their true aspect, but was not able to develop his views with clearness, or support them by conclusive experiments; he cannot therefore be considered, like Lavoisier, as the founder of contemporary chemical learning. Science is a universal heritage, and, therefore, it is only just to give the highest honour in science, not to those who first enunciated a certain truth, but to those who are first able to convince others of its authenticity and establish it for the general welfare. But scientific discoveries are rarely made all at once; as a rule, the first teachers do not succeed in convincing others of the truth they have discovered; with time, however, a true herald comes forward, possessing every means for making the truth apparent to all, but it must not be forgotten that such are entirely indebted to the labours and mass of data accumulated by others. Such was Lavoisier, and such are all the great founders of science. They are the enunciators of all past and present learning, and their names will always be revered by posterity.

It should be noted that Priestley died with an implicit faith in the truth of the phlogistic theory; Cavendish made a careful examination of the two theories of Stahl and Lavoisier, and

[20] Ramsay, *op. cit.*, pp. 108-9.
[21] Ramsay, *op. cit.*, p. 112.
[22] Pp. 17-18, note 25.

with the facts before him deliberately chose the former; Black, however, became a convert. *The whole history of air and fire from Mayow to Lavoisier shows that the main thing in scientific progress is not an abundance of experiments, but true reasoning on the basis of such phenomena as are known.*

The latest extension of experimental knowledge of the properties of air has been made in our days by Lord Rayleigh and Professor William Ramsay. By careful weighing it was found that nitrogen prepared from ammonia is somewhat lighter than "atmospheric nitrogen." This was very puzzling, and led to very careful experimentation, resulting in the discovery of a new gas in the atmosphere, which the discoverers named "argon," on account of its inactivity. In addition Professor Ramsay has discovered helium, krypton, metargon, xenon and neon.

From the history of discoveries on the nature of fire and the theories concerning it, one thing stands out in strong relief, and that is that most of the work which has been done in this field is of a different nature from that done by Swedenborg. Although he made experiments himself, and drew upon those of others, Swedenborg abstracted his attention from the phenomena themselves to the causes of the phenomena, their hidden geometry and motion. His *Principia* describes the geometry and motion of the invisible things of nature, and is a statement of reasons why invisibles must be constituted in a certain way because visibles are constituted in an analogous manner. It is a theory of the nature of things which cannot be seen, based on the observation and experimental data of things which can be seen. Let us now follow the development of Swedenborg's theory of fire, first as presented in certain letters written to Eric Benzelius, Swedenborg's brother-in-law and early preceptor, and in the series of works written from 1717 to 1722; afterwards let us compare the later statements contained in the works written in 1734 and 1738 with those of the earlier period, comparing also some of the experimental results obtained by Tyndall and closing with a brief survey of the modern status of our subject.

As early as 1717 Swedenborg presented ideas of round par-

ticles in the interiors of nature, and thought that colour is produced by the modification of light in objects, that sight is caused by an undulation of the ether, and that fire is caused by a celerity of motion of something in the air or around its particles.[24] In 1718 he writes to Eric Benzelius:

I send you something new in Physics upon the particles of air and water, proving them to be round, which may militate against the philosophy of many; but as I base my theory upon experience and geometry, I do not expect that any one can refute it by arguments. . . . The use of this seems to me to enable us more thoroughly to investigate the nature of air and water in all its parts: for if the true shape of the particles is once discovered, we may obtain with it all the properties which belong to such a shape.[25]

In 1719 he writes:

What I have in hand consists, first, of a minute description of our Swedish blasting-furnaces; secondly, a theory or an investigation into the nature of fire and stoves where I have collected everything I could gather from black-smiths, charcoal-burners, roasters of ore, superintendents of iron-furnaces, etc., and upon this the theory is based.[26]

In 1720 he writes:

I have proposed to myself to examine thoroughly everything that concerns fire and metals, *a primis incunabilis usque ad maturitatem* (from the first attempts and experiments to the maturer results), according to the plan of the memorandum which has already been communicated to you. I take the chemical experiments of Boyle, Reucher, Hjarne, Simons (?), etc., and trace out nature in its least things, instituting comparisons with geometry and mechanics. I am also encouraged every day by new discoveries, as to the nature of these subtle substances, and as I am beginning to see that experience in an uninterrupted series seems to be inclined to agree therewith, I am becoming more and more confirmed in my ideas. It seems to me that the immense number of experiments that have been made affords a good ground for building upon; and that the toil and expenses incurred by others may be turned to use by working up with head what they have collected with their hands. Many deductions may thus be made which will be of use in chemistry, metallurgy, and in determining the nature of fire and other things.[27]

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[24] Cf. *De Causis Rerum* and *Om Elden och fargornas natur; Documents concerning Swedenborg*, Vol. II., pp. 890, 892.
[25] *Documents*, Vol. I., pp. 296-7; cf. p. 299.
[26] *Ibid.*, p. 309.
[27] *Ibid.*, pp. 325-6.

The above quotations show that from 1718 to 1720 Swedenborg was engaged in studying the nature of fire and related subjects. The results of these studies are contained in a number of works written about this time which show Swedenborg's methods of work and how he laid the foundations of his *bullular hypothesis,* which received its final development in the *Principia.* As a member of the College of Mines, Swedenborg, in his duties as inspector, enjoyed abundant opportunity of studying the action of fire in the smelting furnaces, and he turned his observations to good account.

The works which present Swedenborg's theory of fire are especially the following:

1. *On the Nature of Fire and Colors* (1717);
2. *The Principles of Chemistry* (1721);
3. *New Observations and Discoveries on Iron and Fire* (1721);
4. *Miscellaneous Observations* (1722);
5. The *Principia* (1734);
6. The *Economy of the Animal Kingdom* (1738).

Swedenborg's theory of Fire, as contained in the works prior to the *Principia,* may be summed up in the following statements:

I. *Fire is the free motion of a substance or of "particles."*

II. *Flame is a phenomenon perceived by the eye on account of motion set up in the ether by fire.*

III. *Calcination by fire increases the weight of substances.*

IV. *There is a subtle igneous matter which when present among the particles of water produces fluidity, while its absence produces rigidity. This matter is the ether.*

V. *Phosphorescence is produced in a variety of ways by a motion set up in the ether.*

VI. *The Sun and Stars are fiery oceans.*

The points will now be taken up singly.

I. *Fire is the free motion of a substance or of "particles."*

The series of works which we are considering commonly speaks of fire as an element, but that the word "element" is neither used in its modern sense nor in the sense in which it is commonly used in the *Principia* is plain from the context and

also from the whole sweep of Swedenborg's philosophy. The expression "element" is evidently used in the same sense as in the *Principia,* where, in speaking of the fifth finites, Swedenborg says that "they constitute the surface of the particle of air, and supply fire with its element." [29] Compare this with the following from the *Miscellaneous Observations* (p. 108):

The sources from which the matter of fire may come have been pointed out in the preceding pages. 1. From the resolution or decomposition of air. 2. Its particles are inclosed in oily, nitrous, sulphurous substances, and in general in the small channels and pores of things. They are set free by any moving volume of the same igneous matter. 4. And they enter through the minutest pores, pass into the minutest cavities, and form bullæ, and then exhale through the larger orifices.

In the same work he says (pp. 92-3):

According to our hypothesis, then, let the particles of air be bullular, with exceedingly minute particles of fire on their surfaces as in Figs. 39 and 40, where *aaa* are particles of fire, very minute, and which we regard as not bullular, but round, and comparatively hard. But it may appear paradoxical to suppose that fire forms the crust of the air-particle, and at the same time a bulla; let us then consider the consequences of this assumption. 1. Let there be particles, similar to Fig. 39, on the surface of the atmosphere, where they are dilated, because there is no weight above them to press them into a smaller space. Hence, in the highest regions of the atmosphere, on the tops of mountains and above the clouds, we find that the air is very rare, and scarcely affords matter for respiration, or for supporting fire, and exhibits its usual phenomena in the poorest and thinnest manner: a great degree of cold is felt, flame is extinguished, menstrua do not act, and many other effects take place, according to experiment. . . . There is less fire where the particles of air are more rarefied or distended: but more fire where they are more compressed, as indeed follows from the hypothesis. . . . From the above figure of the particles it follows, that in our sublunary world there can be no flame without air; this likewise is proved by experience, for a candle goes out when the air is exhausted, and sulphur and other highly inflammable substances will not ignite at all in the vacuum of the air pump; furthermore, flame goes out gradually in very high situations. 5. In proportion to the renewal of fresh air, the flame is increased, as indeed appears from the shape of the particle. Thus if the crust of the particle of air consist of igneous matter, it follows that there is more fire when the supply of air is large, provided it be fresh, etc., etc.

[29] Part III., chap. vi (near the end).

We have here all the fundamental ideas of fire and combustion which obtain in modern times.

In the earliest work in which Swedenborg treats of fire, he presents substantially the same ideas and the same experiments. This work, written in 1717 and called *On the Nature of Fire and Colors,* says:

> —That Fire consists in the elasticity, the rising [*gjasning*—leavening from yeast], and the fermentation of the atmosphere, is a proposition with great verisimilitude, since fire is nourished by the atmosphere, and it is the atmosphere which pours it out [or, exudes it],—which is what is meant by fermentation. . . . The proposition that fire and colors are caused by the activity [*hastighet*—swiftness, celerity] in the air, when it terminates in the ether, just as when water terminates in the air, or when compressed air terminates in air less compressed, amounts to the same as to say that colour and fire must consist in the outpourings of the atmosphere, or in its stronger motion.

Further references on this subject may be found in *Miscellaneous Observations,* pp. 46, 52, 53, 83, 84, 85, 87, 88, 94.

It appears that by fire Swedenborg sometimes meant heat; see *New Observations and Discoveries, etc.,* pp. 186, 189, 200 bis., 201, 204, 205.

II. *Flame is a phenomenon perceived by the eye on account of motion set up in the ether by fire.*

In the quotations under the preceding heading it was seen that Swedenborg understood the flamy quality of fire to be dependent upon the air. He says further that "flame is nothing more than the fire in hard particles which are flying off, or in fumes" (*Misc. Obs.,* p. 94), and that light is produced "by fire, whose particles are so amazingly subtle, and when undulating will cause an undulation in the rays, or a vibration in the ether." (*Ibid.,* p. 105; cf., p. 104.)

III. *Calcination by fire increases the weight of substances.*

In the *Miscellaneous Observations,* pages 101-2, Swedenborg says:

> I shall show elsewhere, God willing, that the more fire a body contains, the heavier it is, and that the gravity of fire is increased by the quantity; or what amounts to the same thing, that fire is far more ponderous than ether, and consequently that the addition of fire is not the way to obtain levity (cf. p. 54).

IV. *There is a subtle igneous matter which when present among the particles of water produces fluidity, while its absence produces rigidity. This matter is the ether.*

A good general statement of Swedenborg's conclusions on this matter is contained in the *Miscellaneous Observations* (pp. 94-95), as follows:

> We find that water possesses the remarkable property of great fluidity when it is warm, and of great rigidity when cooled beyond a certain period; in fact, that the same particles present the phenomena of solidity as well as of the greatest mobility. No one, I presume, can deny that this change is owing to the presence of an interfluent matter; for as often as heat is applied, the ice thaws, and its particles become fluid; as happens when it is placed over the fire, or during the spring and summer: on the other hand, whenever the fluid is deprived of its fire, the particles collapse into a fixed position. This fact amply proves that the fluidity of the particles of water is caused by some very subtle igneous matter of great mobility, interfluent between them, which separates them from each other, and prevents them from becoming fixed, holding them floating in its bosom in a state of suspension, and communicating its own mobility to them.

In the *Principles of Chemistry* (p. 13) it is stated that the particles of water are in their natural position "when the subtle igneous matter flows between them;" also (p. 17):

> Since the particles of water are of a round shape, and their surfaces are occupied by round particles of a smaller kind, similar in nature, but differing in diameter and magnitude; and since, from the nature of fire, its subtle matter penetrates everywhere among the interstices of water, separates one particle from another, and thus gives a certain motion to each; (but when this heat flies off, the particles become spontaneously fixed and crystallized, as will be seen in the Theory of Ice); hence, if the forms of the particles be taken into account, as well as the motion of the subtle fire, it will be clear that the particles of flowing water are arranged in the natural, or fluid quadrilateral pyramidal position.

Now heat is a predicate of the ether. In the same work (p. 86) the subtle matter is said to be "susceptible of dilatation and compression," also a predicate of ether (cf. p. 199 and *Misc. Obs.*, p. 96 bis.).

See further *Principles of Chemistry*, pp. 26; *Miscellaneous Observations*, pp. 95, 96, 82, 83 bis. It should also be noted that Strutt, the translator of the *Principles of Chemistry*, came to the conclusion that by "the subtle igneous matter so fre-

quently mentioned in the chemical theory" Swedenborg meant "nothing more than the ether" (p. xxxv).

But that there may be no room for doubt a quotation will be made from the *Lesser Principia,* paragraph 166, which clearly defines Swedenborg's conclusions on this point:

*The fluidity of these particles of the tenth kind depends upon the fluidity of the matter of the 7th and 4th kinds, which flows about.*

Among these particles of the 10th kind there flows interruptedly the matter of the 7th and fourth kinds, and because these kinds of particles are gifted with the greatest fluidity, hence also the particles of the 10th kind owe their fluidity to them; for by themselves they cannot be fluid, for they are ponderous and heavy, and have an envelope which does not yield, so that they cannot be compressed, but remain in their dimension continually; hence, since they are heavy and moreover cannot be compressed and consequently cannot be yielding to whatsoever pressure is given them, as the particles of the 9th, 7th, 6th, 4th, and 3d kinds, they cannot be fluid by themselves, but have their fluidity from the circumfluent matter of the 4th and 7th kinds.

From these things may be seen the difference of motion in the particles of the 9th and 10th kinds; the former have a yielding envelope, which has elasticity, which reacts in the degree that it is acted upon, which admits tremulation into itself, but the latter because the envelope does not yield, nor admit tremulation, nor react in a similar and elastic manner as the former, hence there is a great difference of motion; and whatever motion they have, they owe it to the circumfluent particles of the 7th and 4th kinds; the greater motion there is in these, so much the greater is the motion in the particles of the tenth kind.

Now when it is known that the 4th kind of particles is the first element of the *Principia* partly compressed, also that the 7th kind of particles is the ether partly compressed, it at once becomes clear that the interfluent igneous matter on which the mobility of water depends, as stated by Swedenborg in 1721 and the following years, is the ether.

V. *Phosphorescence is produced in a variety of ways by a motion set up in the ether.*

It will be unnecessary to repeat all the instances given by Swedenborg of animals, minerals, effluvia, etc., which produce the interesting phenomena of phosphorescence, but only to quote his conclusion:

According to the bullular hypothesis, it follows that light is nothing more than undulation of the rays, or than vibration of the ether. It has

already in some measure been shown that the rays undulate when the ether vibrates. In this fact we have the explanation of phosphorescence and of the ignis fatuus, both in cold substances and hot, in dry as in moist, etc. (*Misc. Obs.*, p. 104).

In this connection it may be noted that Swedenborg ascribes the phenomena of light to the activity of two ethers, the magnetic and electric. This is of especial interest when brought into correlation with the electro-magnetic theory of light.

Swedenborg's statement that phosphorescence is caused by the breaking up of salt particles in the sea has been criticized, and the true explanation of this phenomenon has been ascribed to living animalcules. Now there can be no doubt that phosphorescence is caused by such animalcules, and that a good deal is known about them; but this in no way conflicts with Swedenborg's general theory. The peculiar electrical phenomena and the production of ions attendant upon the electrolysis of salts in solution may throw light on this subject. It should be noted that the salt particles spoken of by Swedenborg are not crystals, but molecules. This subject needs careful investigation; the last word about it has by no means been said.

VI. *The Sun and Stars are fiery oceans.*

Swedenborg, in the *Miscellaneous Observations* (p. 28), speaking of the primeval matter of the earth, mentions "the fire oceans such as the sun and stars," and elsewhere he speaks of "solar fire" and "the fiery oceans of the world" (p. 117). Similar statements are to be found in the *Lesser Principia.* From this it may be seen that even at this early date Swedenborg conceived of suns as being large fiery spaces, a distinguishing feature of the *Principia.*

You will notice that the arguments, quotations and references adduced above in support of the positions advanced do not depend upon Swedenborg's later writings, but upon those written prior to the *Principia* and the physiological works. The reason for this manner of presentation is that the objection has been made that it will not do to interpret the earlier works by the later ones. Now the writer does not at all agree to that proposition; but in order to meet such objection it was decided to let those earlier works interpret themselves; for they are

quite capable of doing so; they can stand upon their own feet and need no props. If it be admitted that the positions advanced have been proven, and also that, as will presently be shown, the later works present the same views, it must also be admitted that in the present case Swedenborg's works are substantially, although not verbally, a unit; which would be a fundamental admission, since his theory of fire involves his whole philosophy. The proposition that Swedenborg's philosophical system is substantially a unit will be still more clear when the *Lesser Principia* shall have been properly studied, for it is evidently the central link connecting Swedenborg's earlier with his later productions.

In the *Principia* and the *Economy of the Animal Kingdom* Swedenborg restates his theory of fire, with greater fullness will now be shown to be in agreement with those advanced in the later works.

I. *Fire is the free motion of a substance or of "particles."*

While the subjects treated of in the *Principia* are largely on the same plane as those treated of in the earlier works, the terminology is quite different. Instead of "bullæ" or "particles," constant mention is now made of the finites, actives and elementaries defined in the earlier part of this paper. The five finites, successfully compounded from the first, when in a free local motion, are called actives. In the *Principia,* when treating of finites, actives and elementaries, Swedenborg says:

> We admit of entities only of a three-fold degree, namely, Finites, Actives, and those which are compounded of the two, namely, Composites or Elementaries. With respect to Finites we affirm, that one is generated by the other; and that all the Finites of the genus thus arising have the greatest possible similitude one to the other; and differ only in degree and dimensions. Hence the fifth Finite is similar to the fourth; the fourth to the third; the third to the second: the second to the first; the first to its own proper Simple: so that he who knows the nature of one knows the nature of all. In the same manner we affirm, that Actives have the greatest possible similitude the one to the other, that the fifth, fourth, third, second, and first Active are all of the same nature; differing *only in dimension and degree,* in the same way as Finites. That Elementaries also are similar one to the other, since they are compounded of the Finite and Active; the Finites occupying the superficies, the Actives occupying the interiors; that hence the first,

second, third, fourth, and fifth Element are all similar one to the other; so that he who knows the nature of one knows the nature of all.

When it is known in addition that the local activity of the five finites produces five kinds of fire, differing in subtlety, the following passage from the *Economy of the Animal Kingdom* will be understood:

Of the circumambient universe or world, there is a series of substances simply derived from the first substance by the order of succession. The second series is that which the same substances constitute when left to themselves and their own nature, or when endowed with the liberty of gyrating, whence comes fire, both solar and inferior elementary fire.

A more particular treatment of the nature of fire is found in n. 84 of the same work:

That *fire*, glowing and luminous, arises from the disengagement of the parts of the auras, and from the excitation of the parts thus liberated into their natural gyration; and that *flame* is the smoke or soot which consists of so many as it were molecular burning coals, or that it consists of small volant ignited particles, can be shown to ocular demonstration by experiment: and as the knowledge of one opposite may be derived from the knowledge of the other, we may hence deduce the nature of *cold*. It may thus be seen that nothing real exists in heat, fire, flame, or cold, since they are only the affections and qualities of trembling and gyrating substances, or on the contrary, of such as are quiescent.

In Swedenborg's *Corpuscular Philosophy in Brief* the theory of fire and substance is restated in the following compact form: "1. There is a first substance of the universe with others similar to it in order. 2. There is an activity of this substance, whence is fire."

Compare Swedenborg's theory of fire and flame, and also that of Mayow and his successors given above, with the following from Tyndall's great work, *Heat, a Mode of Motion:*

Most of you know the scientific history of the diamond, that Newton, antedating intellectually the discoveries of modern chemistry, pronounced it to be an unctuous or combustible substance. Everybody now knows that this brilliant gem is composed of the same substance as common charcoal, graphite, or plumbago. A diamond is pure carbon, and carbon burns in oxygen. I have here a diamond, held fast in a loop of platinum wire; I will heat the gem to redness in this flame,

and then plunge it into this jar, which contains oxygen gas. See how it brightens on entering the jar of oxygen, and now it glows, like a little terrestrial star, with a pure white light. How are we to figure the action here going on? . . . You are to figure the atoms of oxygen showering against this diamond on all sides. . . . Every oxygen atom, as it strikes the surface, and has its motion of translation destroyed by its collision with the carbon, assumes the motion which we call heat: and this heat is so intense, the attractions exerted at these molecular distances are so mighty, that the crystal is kept white-hot, and the compound, formed by the union of its atoms with those of the oxygen, flies away as carbonic acid gas. . . . It is to the clashing together of the oxygen of the air and the constituents of our gas and candles that the light and heat of our flames are due. I scatter steel filings in this flame, and you see the star-like scintillations produced by the combustion of the steel. Here the steel is first heated, till the attraction between it and the oxygen becomes sufficiently strong to cause them to combine, and these rocket-like flashes are the result of their collision. It is the impact of the atoms of oxygen against the atoms of sulphur which produces the flame observed when sulphur is burned in oxygen or in air; to the collision of the same atoms against phosphorus are due the intense heat and dazzling light which result from the combustion of phosphorus in oxygen gas. It is the collision of chlorine and antimony which produces the light and heat observed where these bodies are mixed together; and it is the clashing of sulphur and copper which causes the incandescence of the mass when these substances are heated together in a Florence flask. In short, all cases of combustion are to be ascribed to the collision of atoms which have been urged together by their mutual attractions.

Swedenborg uses similar language when describing the active motion of finites, herein anticipated the modern theories of combustion and the nature of oxygen and related substances. We will close this section by quoting the important definitions of fire and flame given in Part II., Chap. VII., of the *Principia:*

The actives themselves, which constitute the bright and living fire, can in no way impede the fluxion or gyration of the magnetic element; as will be shown in our theory of the fourth and fifth active. For the fire, which is luminous and acts by flame, consists in the motion of actives highly compounded; which in the volume of the particles of the most subtle magnetic element are capable of perfectly performing their gyres without restraint or retardation; just as masses can, or highly compound bodies, in the air or ether.

II. *Flame is a phenomenon perceived by the eye on account*

*of motion set up in the ether by fire.* That this statement, as also the one under V that *Phosphorescence is produced in a variety of ways by a motion set up in the ether,* contains the statements of the *Principia* on these subjects, will be evident on a study of Part II., Chap. VII., on Fire, where, among a great many important statements, is found the following:

That the actives of the fifth finite may in their space urge an ethereal volume into such a high degree of motion that this volume may give rise to modifications which have the appearance of light.

The actives of the fifth finite set in motion the fourth finites, which form the envelope of the ethereal elementary, and since the eye is the organ of the ether, when this motion is sufficiently strong, the eye sees a light. This subject, especially in reference to phosphorescence, is further treated in Part III., Chap. V., n. 21, of the *Principia,* as follows:

Motion diffused from a given centre through a contiguous medium (*per contiguum*) or volume of particles of ether, produces light. . . There are corpuscles which resemble a species of effluvia, and which are so small as to be enabled to move only a volume of ether, but not a volume of air; and these, if spontaneously moved, excite light to a certain distance. If they are not spontaneously moved, but are put in motion by means of the tremulation of the parts in any hard body in which they reside; in this case also light is excited, and in like manner electricity, so long as the tremulation continues. That the motion of the ether, when diffused in all directions from a given centre, or when diffused to equidistant circumferences, occasions the representation of light, is evident from what we have stated; for ether, when put into a general motion or nisus toward the peripheries, occasions itself to be reflected from every object it encounters according to its angle of incidence, and forms as many centres as there are objects to meet it. Hence arises a representation of the species and effigies of things by light; a representation which could not be effected unless the contiguous volume of ether were put into the state of general motion, or effort to general motion, which we have already mentioned. . . . Since therefore local motion, or the effort to local motion, in the ether, is the cause of light, and light is the cause of the species of things represented to the eye, it follows that light may arise from either warmth or cold as a cause.

With respect to phosphoric or meteoric light, as also with respect to electricity, we may observe that both proceed from the same source; namely, from the ether either put into a state of local motion, or else in an effort toward it. The *ignis fatuus,* as it is called, is only a motion

dispersed through the volume or contiguous area of the ether, without any rigid extension of its particles. For if there be any corpuscles so small as to move only the ether, like the corpuscles or effluvia for instance proceeding from the magnet, and which move only the second or magnetic element, then I would observe, that, by means of the motion of these corpuscles or effluvia, light exists; and if these corpuscles circumgyrate, whether spontaneously or not, provided there be some cause or other to occasion circumgyration, they immediately put the ether in motion and cause light, without the expansion of any ethereal particle; just as is the case with air, which may be moved in volume and contiguously to a distance without the expansion of any particle, and may thus produce sound. The *ignis fatuus* therefore is a local motion of the ether produced by the motion of certain smaller corpuscles, so that the cause of warm and cold light is one and the same. The corpuscles or effluvia we have mentioned may be put into a gyration and motion either spontaneously, that is to say, *ex se,* or from some internal cause; or else by the tremulation of some hard body, in which they are and from which they proceed.

IV. *There is a subtle igneous matter which when present among the particles of water produces fluidity, while its absence produces rigidity. This matter is the ether.*

The truth of this proposition was established above by evidence drawn from the earlier works. A similar course will now be taken with the later works, where Swedenborg himself calls the matter in question "the ether," and moreover defines his earlier statements. In the *Principia,* Part III., Chap. IX., n. 2, he says:

That particles of water, or finites of this kind, cannot move one among the other like elementaries, unless there be interfluent elementaries to carry these particles with them, and thus set them in motion. That the particles of water thus owe their motion and fluidity entirely to the interfluent ether. That æqueous particles are the more mobile and fluid, in proportion as the circumfluent ethereal particles are the more mobile, extended, and rigid; and the less mobile and fluid in proportion as the circumfluent ethereal particles are the less mobile, extended, and rigid, but as it were flaccid. That in proportion to the want of mobility and tension in the ethereal particles, the æqueous particles are torpid and languid, uniting and concreting into a hard mass. That finites of this kind or aqueous particles owe their fluidity or mobility to the interfluent ether, which in its own nature is mobile because it is elementary, is evident *a priori,* or from the principles already laid down; for the particles of water do not possess an even (*levi*) and uniform surface, but one which commonly coheres in a state of

contact with those which are in proximity with it; neither do they possess a yielding elastic surface; for which reason they cannot reciprocally act upon each other by their force of elasticity and yieldance, and thus become similar and uniform in every state of motion and compression; nor can one particle apply itself to another in the manner of elementaries, which cannot become reciprocally fixed and colligated; but still in whatever motion they may be, they are, solely by reason of their change in dimension (their figure being in other respects exactly preserved), enabled to maintain a mobility. For when the ether is in its most mobile and rigid state, that is to say, when its temperature is warmest, it renders the water most highly mobile, and makes it undulate and boil from the top to the bottom. The ether moreover circulates itself in water, forms itself into vapours, and under the appearance of air continually seeks the surface, and ejects itself in the same manner as when steam carries a body upwards. Still in a perfectly quiet and serene state of the ether, when its particles, from being flaccid as it were, are unable to move the aqueous particles from one place to another or to keep them separate, it is impossible but that the aqueous particles should become confluent and attach themselves one to the other; the ether itself partly escaping, inwardly glomerating partly into vapour, partly into larger particles, and by the solution of its flaccid and highly yielding surfaces inclosing itself like air and variously occupying the spaces within, from which it is unable to escape as long as it is between its own larger or else congealed vaporous surfaces of the water. This is evident *a posteriori,* because when there is no motion between the ethereal particles, the æqueous particles coalesce into a certain hard and material mass, from which they cannot be liberated except by the ether being put into motion and a state of rigidity. The essentials, therefore, and numerous elementary qualities which we have observed in the wave and current of our finites, we must not attribute to their own nature or virtue, but to the interfluent element. . . . It appears then that we cannot consider the aqueous particle as any other than a certain hard body rendered fluid by an extremely small degree of heat; for some hard bodies there are which become liquid by a smaller, some by a larger and more intense degree of heat: water commonly yields to the smallest degree, which softens its rigidity and causes it to flow as a liquid.

That by the "subtle fiery matter" of the earlier works is meant the "ether" of the later ones is evident from a comparison of n. 75 and the context, in the *Economy of the Animal Kingdom*, with the statements of the *Principles of Chemistry* respecting oil. In the *Chemistry* it is stated several times that the "subtle fiery matter," or the "subtle matter," when surrounded by ramenta of the fourth kind of hard material, con-

stitutes oil. In the *Economy* the same thing is stated, and the "ether" is said to occupy the internal cavity. Nothing could be more conclusive.

In order that it may be seen how modern experiment bears out Swedenborg's theories of ice, water, and ether, a quotation will now be made from Tyndall, where, in analyzing the process by which water is frozen, by sending a beam of light through a block of ice and watching the stages of melting, he says:

> And now I have to draw your attention to two points connected with this experiment, of great minuteness, but of great interest. You see these flowers by transmitted light—by the light which has passed through both the flowers and the ice. But when you examine them, by allowing a beam to fall upon them and to be reflected from them to your eye, you find in the centre of each flower a spot which shines with the lustre of burnished silver. You might be disposed to think this spot a bubble of air; but you can, by immersing it in hot water, melt away the ice all around the spot; and the moment the spot is thus laid bare, it collapses, and no trace of a bubble of air is to be seen. *The spot is a vacuum.*

Swedenborg would have said that the space was filled with ether.

VI. *The Sun and Stars are fiery oceans.*

This is a familiar concept of the *Principia,* where the first and second actives, or the first two degrees of fire, are said to constitute solar spaces.

From what has been said it may be seen how erroneous is the opinion of those who suppose that Swedenborg's theories of fire and air were exploded by Priestley's discovery of oxygen gas. Only a very superficial examination could lead to such a conclusion; we would draw the attention of all earnest students to the development of Swedenborg's *bulbular hypothesis,* and especially its final statement in the *Principia.* Swedenborg's theory of fire makes its first appearance as activity (*hastighet*) of the atmosphere, then it is the motion of a particle on the surface of the air particle, it is the "element" fire, and finally it makes its appearance as the fifth finite and the other finites in local activity, one of the fundamental concepts of the *Principia.*

Limitations of time will allow only a reference here to the progress which has been made in our subject, both experimentally and theoretically in recent years. The action of electricity and magnetism on flames, the phenomena of vacuum tubes,[30] the questions relating to the temperature of ignition and experiments on light, color and heat open up a wonderful vista of investigation in which will be found interior correspondences.

A great number of the phenomena of fire, flame and combustion may be observed in the burning of a candle, and it has been well said that "to understand the occurrences included in the everyday process of burning a candle is to understand the whole of chemistry and no small part of physics." [31] Some of the principal things to be observed are, that the candle is composed of hydrogen and carbon. These substances when sufficiently heated combine with the oxygen of the air and produce water and carbonic acid gas. Experiment shows that the flame of a candle is composed of several parts. When the substance of the candle is drawn up by the wick by reason of the heat [32] it is converted into gaseous hydrocarbons; these constitute a zone by themselves. Surrounding this zone is another, where a partial combustion of the gases takes place, and on the outside is still another where combustion is complete. If an inflammable substance be inserted into the first zone it will not burn, because the oxygen of the air is not present; but if a tube be inserted in which the gaseous hydrocarbons may be led away they may be lighted at the other end of the tube. The middle zone is the one where light is principally produced and this is ascribed to the presence of particles of carbon, heated to a white heat; a platinum wire in flame, and the lime-light, present similar phenomena. In the outmost zone, where combustion is

[30] A carbon monoxide Geissler tube, with an electric discharge passing through it, presents an appearance strikingly similar to that of a flame of carbon monoxide.

[31] *The Chemistry of Fire, by* M. M. Pattison Muir, M. A.; Methuen & Co. 1893.

[32] Van 'T. Hoff says that "reaction occurs more or less rapidly below the temperature of ignition" and gives as instances phosphorus, phosphine, arsenic, sulphur, hydrogen, hydriodic acid, carbon monoxide, ether and paraffin. See his *Studies in Chemical Dynamics,* Chemical Publishing Co., Easton, Pa., on the *Temperature of Ignition,* pp. 136-142.

complete, there is not so much light, but a great degree of heat. That heat depends upon the relative completeness of combustion may be seen from the Bunsen burner.

Besides flames produced by the combination of hydrogen and carbon and many other substances, with oxygen, there are others produced by the combustion of hydrogen and antimony in chlorine, and of strips of copper in sulphur vapor.

The state of investigation at the present time in the field which has been examined in this article is a most interesting one, and when the methods of analysis and the appliances in use today shall have been still further perfected the investigator may expect to determine by experiment the accuracy of the numerous positions which have hitherto been advanced by scientists and philosophers as probable theories and hypotheses.

ALFRED H. STROH.

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## NOTE AND COMMENT.

Owing to the limited space at our disposal, two of the reviews under this head have been carried over from last April. The fact that this issue and the preceding both exceed the number of pages that have been regularly provided for sufficiently indicates the constraint under which the magazine is laboring.

The following note was received from the Secretary of the Association too late for publication in July.

"The original Swedish of Swedenborg's earliest poem (see minute 263 of proceedings of Swedenborg Scientific Association) will shortly appear in *Morning Light*. Mr. Hyde writes that all other particulars will be found in his Bibliography of Swedenborg's works, which he hopes to complete in the near future."

In accordance with this promise the original was published in *Morning Light* for July 26.

A translation of a lecture delivered before the Seventy-third Session of German Scientists and Physicians in Hamburg, by Dr. Max Neuburger, of Vienna, a translation of which was also read at the last annual meeting of the Swedenborg Scientific Association (see minute 319 in *The New Philosophy* for October, 1902), was published in *The New Church Messenger*, August 13 last. In the issue of that paper for August 27 the following information was added:

"Dr. Max Neuberger, Privat-docent of the Vienna University and editor of the Vienna Journal of Medicine, the author of the address

on Swedenborg's "Animal Kingdom" before a medical convention at Hamburg, which was read by Mr. Odhner before the Swedenborg Scientific Association, and which was translated for the Messenger for the issue of August 15th, has expressed a lively interest in the Association, and announces his desire to translate Swedenborg's work on "The Brain" into German. The Association will gladly further him to the extent of its power, in his purpose thus to introduce the philosophy of Swedenborg to the knowledge of the German scientists."

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**Swedenborg's Ontology:**—After an interval following the publication of Swedenborg's treatise on Tremulation, the scholarship of the Academy of the New Church, and the publication department of the Massachusetts New-Church Union, have again combined to present to the world a tasteful and scholarly opuscle of Swedenborg's philosophical writings. This, the second English edition of the *Ontology,** is practically a new translation, and has many valuable features which the first edition lacked.

The preface (xvi pages) gives a full and interesting description and history of the treatise, and of its Latin and English editions. A copious index and the numbering of paragraphs make the treatise easy of reference, while helpful footnotes and critical notes at the end attest the thoroughness with which the editor and translator has addressed himself to this labor of love. In every respect this little dictionary of philosophical terms has been made as inviting and useful as possible, and we heartily congratulate both the translator and editor, and the publishers on the result of their work.

Where so much is done from a disinterested affection for the advancement of philosophy, it seems ungenerous to criticise, yet we cannot dismiss the wish that in the publication of these little treatises the ultimate gathering of them together in permanent book-form were contemplated, and provision made therefor by a size of page uniform with the standard English edition of Swedenborg's philosophical works.

The plan of this little treatise is similar to that employed in a number of Swedenborg's philosophical works. He first brings together what eminent specialists have written on the subject in hand, digests it, and then, with such help as he may derive from them and under the guidance of new and luminous principles, he makes his own reflections and conclusions and casts them into form.

In this treatise Swedenborg has laid the thinkers of the three most enlightened nations of Europe under tribute. He quotes mainly from Scipio, Dupleix, a French statesman and philosopher (1569-1661);

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**Ontology; or The Signification of Philosophical Terms.* By Emanuel Swedenborg. Translated and edited by Alfred Acton, Professor of Theology in the Academy of the New Church. Boston: Massachusetts New-Church Union. 16 Arlington street, 1901. Pp. xviii, 60. Price, 50 cents.

Robert Baron, a learned Scotch minister and philosopher (1593-1639), and Christian Wolff, the German philosopher (1699-1754).

Swedenborg's resultant definitions are valuable for their intrinsic worth, for their bearing upon his use of terms in subsequent works, and for their foreshadowing of definitions which he gives in his theological writings.

He treats here of Form and Formal Cause; Figure; Organ, Structure; State, Change of State; Substance; Matter, the Material; Extent, Extension; The Continuous; The Contiguous, Part; Body, Corporeal Things; Essence, Essentials; Attribute; Predicate; Subject; Affection; Accidents, Contingents; Modes, Modifications.

The treatise is not complete; some of the subjects being fragmentary.

E. J. E. S.

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**The Philosophy of Swedenborg.** *A Paper read before the New Church Doctrinal Union in the Hall of the Church of the New Jerusalem, Queen's Park, Glasgow, March* 10, 1902. *By the Rev. Oswald Chambers, Tutor of Philosophy, Dunoon College, Kirn, N. B.*

This little pamphlet, put forth by the Scottish New Church Evidence Society, is remarkable in being the work of one who has a professional acquaintance with philosophy, but who is outside the membership of the New Church. From this point of view it is of special interest; and it is of value as a testimonial from the ranks of professional philosophers.

The author reflects the great admiration for the man which is shown in the utterances of Coleridge and Emerson, but it is gratifying to note the absence of the tone of critical superiority which these men often assume.

The usual recognition of Swedenborg's attainments as a scientist is given without stint or qualification; and his system of philosophy is presented as unique and wonderful in its completeness and in its sufficiency to lay open the whole truth of the universe. In these aspects, the lecture gives great satisfaction to the Swedenborgian.

Our present purpose, however, is to consider it as an attempt to treat Swedenborg as a philosopher, and to judge as to how far it would serve to recommend his philosophy to the profession. It is obvious, in the opening sentences, that Swedenborg stands as a unique, uncomprehended personality, whose life and thought transcended the ordinary range of human experience. His intromission into the spiritual world is a part of the mystery of man, and must be accepted as a fact, but which remains unexplained, if not inexplicable. But the author's special philosophic interest lies in the fact that he sees in him a unique, transcendental principle at work, which he mastered and which yielded all the results of his vast and marvellous system. When we look a little closer for the philosophic expression of the principle, we find that it is the doctrine of *Trines,* the concepts of *End, Cause* and *Effect.* In short, the author

sees in the doctrine of *degrees* and *influx* the essence and the epitome of Swedenborg's philosophy.

It would lead us too far into Metaphysics and into the field of history to attempt a criticism of the author's philosophical standpoint, or of his treatment of the philosophical significance of Swedenborg's doctrine of degrees. It is enough to remark that the Kantian conception of thing-in-itself, a mere figment of common sense realism, is useless and pernicious as a principle of interpretation; and that likewise the concepts of *End, Cause* and *Effect,* while of great and positive philosophical value, need to be passed through the alembic of critical reflection and cleared of all mechanical and materialistic assumptions and associations. On this ground the author's metaphysics must be judged inadequate, if not misleading and delusive. For example, the assertion, the most interesting from the philosophical point of view in the paper, that a knowledge of degrees gives us a knowledge of things-in-themselves, is a delusive and insignificant prediction. As a matter of fact, the author simply goes on to summarize Swedenborg's doctrine and does not seem to be aware of the necessity of interpreting it and applying it. All that we have in the end is a large and complicated abstract scheme, a complete hierarchy of concepts of a certain order, but no insight and no explanation. Instead, we have glowing predictions.

The paper would probably be serviceable to the general reader in promoting a favorable attitude towards Swedenborg, but it would be a mistake to place it in the hands of a serious student of philosophy with the expectation of securing his attention and inducing him to look to Swedenborg for the solution of fundamental problems.

Nevertheless the dominant sentiment of the paper that Swedenborg is unjustly neglected by professional students of philosophy, and that he will one day have recognition, is amply justifiable and forcibly expressed.

L. F. H.

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**Swedenborg's Doctrine of End, Cause and Effect:**—The reference to Swedenborg's doctrine of End, Cause and Effect, in the notice of Mr. Chambers' paper, calls for further comment.

In the interests of philosophy, we need, not so much a mere statement of the doctrine, however complete, although this of course would have its own importance, but as students and expositors we need to go on to the unfinished task of interpretation and application. A few words in this direction may indicate more precisely the nature of this task.

The doctrine asserts that "In every created thing, both greatest and least, there are End, Cause and Effect." (D. L. and W., No. 154.)

We may take "thing" here to be any object which we regard as having a definite, separate existence. A pebble on the beach, an atom, an organic cell, a plant, an animal, a planet, a sun, the cloud, the wind, water, sky, heat, light, a feeling, a thought, a spirit, the material world, the spiritual world, the whole finite universe would be examples. Now select any one of these and apply the doctrine. Take the pebble. No

"thing" in the list has a more obstinate separate existence for our ordinary experience. In this pebble, then, there are End, Cause and Effect. In other words, it is the fulfillment of a purpose and the product of mental life. We see at once that such a statement transforms our ordinary conception of the pebble, and we must disabuse our minds of the idea that it exists as an independent, identical, self-sufficient object. Even its geological history and its mechanical properties require this much. But we have to go further and transcend both geological history and mechanical theory.

A little critical reflection makes it impossible for us to conceive the pebble as the absolute, independent, material body we ordinarily take it to be, i. e., a thing-in-itself of common sense realism. It must be transformed and viewed as a product of spirit, created, in part, at least, in and by the act of seeing it. So transformed, we can then regard it as the outcome of a process of self-representation and self-realization. It represents and realizes an end which is a definite state of Love. In other words, the pebble is the concrete individual existence of a certain qaulity of Love. It *is* Love defined, formed, expressed, and made a concrete individual.

We hold, therefore, that Swedenborg's doctrine of End, Cause and Effect must be interpreted in terms of his doctrine of Love.

Everything is an End realized, because it is a product of Love, the definite, concrete, individual existence of Love.

Everything has its cause in the self-representative, self-realizing activity of Love.

Everything is an Effect, because everything is the result of a process of choice, volition, organization and expression.

It is in this direction that we are to look for the developments of the New Philosophy. L. F. H.

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**"Tendencies in German Life and Thought since 1870":**—An essay of rare value and interest to those who believe in the new philosophy, is that of Professor George Simmel, of the University of Berlin, on "Tendencies in German Life and Thought since 1870," translated by W. D. Briggs, Ph. D., of the Western Reserve University, of Ohio, and appearing in the February and March numbers of the *International Monthly*. The essayist gives a searching analysis of the recent movements in educational, social, philosophic and religious life in Germany, describing what we would know as the woman movement, also the relations of the Catholic and Protestant creeds, the changes in industrial and labor interests, and, what is of chief importance, the great reaction the higher scientific thought is undergoing in regard to the spiritual element in knowledge and in morals.

"Natural science and in a great degree, also, philosophy, during the last few decades, have been materialistic; that is to say, they were not only convinced that all material processes must be explained through the assumption of purely material causes, to the total exclusion of all

that were spiritual or transcendental, but also that the phenomena of consciousness were, at bottom, nothing more than complicated mechanical processes that took place in the cortex of our brain. This most extreme externalization of that which is most spiritual, however, was finally thoroughly refuted by means of two ideas. First by this, that there was discovered the absolute inconceivability of the notion that a spiritual process should be the result of a material process. If it were that, then it must also itself be a material process; for, by the very assumption of materialism itself, physical processes can beget only physical processes. But to assert that ideas, desires, feelings are material processes in the brain, that is a way of speaking that can convey a meaning to no one."

"It is perceived that the scientific conception of the world itself rests upon a spiritualist and metaphysical basis; it not only mirrors the external, objective existence of material things, but it is a product of the human power to form ideas of things, and is dependent upon the inner laws of this power; it is guided and organized according to the changing demands of thought; it rests everywhere upon assumptions that cannot be proved, that can only be believed; it employs everywhere the enigmatical notions of time, space, matter, effect, feeling, life and countless others, which are far beyond all calculations, and yet constitute the indispensable union and explanation of our relatively very slight and fragmentary real experiences.

"And, secondly, even the knowledge of nature accumulated in this way, with the assistance of so much that lies outside of experience, does not afford a satisfactory, complete and unified picture of being, can tell us nothing of the origin of things in general, nor of the origin of life, nor of the ultimate essence of the mind."

"Far beyond the domain of science rests the whole standard of values, particularly the ethical and aesthetic, which draw the lines of distinction in our world-picture and distribute the emphasis in a way that is thoroughly incomprehensible on the basis of mere natural law. In consequence of our having come to this, the need of great generalization, uniform points of view, all-embracing philosophic ideas, has in wide scientific circles made itself felt above that of disconnected empirical investigations."

"From the apparently merely empirical and objective observation of material things the mind has now been led to consider the inner conditions, in the absence of which neither empiricism nor an object can exist at all. To its other duty, however, our philosophy has not shown itself equal; it has not brought into existence, on the basis of modern experimental sciences, a new theory of life. The great synthesis that shall unite all the currents of existence as known to us into consistent ideas, that shall convert all external reality into spiritual values, and satisfy all the needs of the spirit with the result of knowledge,—this great synthesis we still await."

F. S.

# THE NEW PHILOSOPHY.

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## THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL SWEDENBORG.

### CHAPTER IV.

(*Continued.*)

**89.** 10. *Smell excites the alternate forces of respiration from external causes.* 1. This is true, as is evidenced by many things, as by intestinal worms, by diseases of the blood (*hematicis*), by the tickling of the palate, and the like, which cause a slight sensation of touch and pricking; 2, they excite the whole organic mechanism, the œsophagus, the stomach and the intestines into contrary motion, trembling and convulsions. 3. Now as regards the fibres, it excites the whole muscular mechanism by the breath of the mouth, by heat, by hot water, by the hand, in another way by the pricking of the lips and by touch, as the muscular mechanism of the heart, of the diaphragm, of the stomach; even after death stimulation indicates this. 4. Still more so does the olfactory touch, which arises from similar causes, and indeed it excites the mechanism of the brain, into all parts and membranes of which it flows, and the form of which is according to a more perfect modification. 5. The ultimate composition of this is according to the form of the modification of smell. 6. The external and internal cause is everywhere present for exciting something, after the

inversion of the body; for the soul which is in beginnings, and the body which is in effects conspire so that all mediate things coincide, as has been observed everywhere above. 7. The external cause of the excitation of the brain into animatory motion, and thus into the motor and local part, or into contraction and expansion, is the friction and pricking of the parts producing smell; this fibre obeys more fully than the muscle and its fibre, for it is better adapted for acting. 8. This is especially so, since in the nostrils, the whole mucous membrane, the bones of the cranium, the *dura* and *pia mater,* the fibres and the vessels conspire; for one touch pervades the whole common membrane; thus all things are connected, and follow each other even to the beginnings. 9. Consequently there are common mutations of state induced upon the cortex, wherefore also upon the whole brain; mutations of state are brought about without contraction and expansion; these mutations are, however, from smell arising together with expansion and contraction, for the mammillary processes lie like bags, and are inrooted in all the fibres. 10. At every touch the fibres and membranes are corrugated, but according to touch and the kind of things touching, more or less, hence there is a modification with contraction, which pervades even to the cortical substance. This proceeds from a double sense; for while the sense of smell produces modification, the sense of touch produces a general modification together with a certain kind of corrugation. 11. While the fibres are corrugated they are also contracted, but at that time indeed the cortical substance is expanded, likewise every cavity of the brain, as is to be taught in regard to the brain. 12. Therefore inspiration makes for the expansion of the cortex or vital substance, together with the soul, in which is life and which expands. 13. But the cortex indeed falls together and is compressed of itself, in which is as it were death; thus there is a perpetual battle between life and death; the soul with the forces of the body, especially with outmost things as those of smell, resuscitates life, but the body collapses of itself. 14. Hence we see that the respirations of the lungs, and the animations of the brain coincide; (see my tract).

90. *The sense of smell exists only at the time of inspiration, but not at the time of expiration,* on account of a manifest use,

1, in order that the brain may be excited by the alternate forces of the body and by the soul, or by things most remote; 2, lest smell and sense be struck by incongruous things, which slip forth from the lungs, which would create perpetual nausea; 3, wherefore no one perceives his own offensive exhalations except by reflection, or from others. 4. That putrid things go forth from the lungs, see Part II, on the Lungs. 5. Then also the fibre is in its corrugation, the purer blood then flows into the cortex, which being stretched by corporeal causes is duller of feeling, as the fibre is of carrying away. 6. Furthermore the nexus itself induces this; for at the time of inspiration all things are, by the expansion of the ventricles and cavities, and by the corrugation of the fibres, in a state of the reception of sense, because they deport both one and the other kinds of contact at the same time; thus also the mammillary processes and their insertion through the cribriform plate. See further in those things which have before been excerpted concerning the mammillary processes. 7. Thus the nexus ought to agree with the operations; 8, wherefore that relation is taste and touch. 9. While inspiration subsists from the body, external ideas and sensations or those of the body creep up; in expiration ideas descend from the superior region or from the soul, as has been noted above; smell represents the ideas of this to the life. 10. Thence also it is that expiration takes place from the less aperture into the greater, inspiration, from the greater into the less; thence is impetus and opposition.

91. 11. *The sense of smell and of nasal touch also excites the pituitæ of the brain and of all the organs of the head, especially of the eye, and urges them to discharge.* 1. This is the prior consequence, because it excites the brain into a kind of corporeal life. 2. This is to be considered as an effect. 3. This, not only the causes, but also the nexus, induce; for all things conspire to these ends. 4. These things have been treated of in the *Second Part* concerning the nose; but now more particularly.

92. *This sense excites the pituitæ of the brain, and draws them down, through the foramina of the cribriform plate, into the nostrils.* 1. That this takes place from the sinuses of the brain, experience proves; for thither a passage lies open to the

air, which there circulates, and in the vapors of which are enfolded by heat and by vibrations, both the sense of smell and the hearing of speech; 2, indeed the air there is seen entering thither, and breaking forth thence, even forcibly enough for the extinction of a candle. 3. There are yet many invisible passages in the cranium, for it is everywhere lamellated, and thither enters the offshoot of the mucous membrane; there the lymph is driven out by vibration, thus by living forces. 4. The bones of the nostrils are the very fulcra of the bones of the cranium; from the peripheries to their own fulcra all fluid tends, as to their own foci,—middles,—centers of gravity. 5. Furthermore there is an opening in the foramina of the cribriform plate between the membranes which accompany it to the papillæ, and to the glandules; which are spread over the entire membrane, between the *pia mater* and the fibres, and among the fibres themselves. 6. These tremble from the sense of smell and of touch, the turbinated bone and the ethmoid in the meanwhile greatly assisting; 7, these are alternately contracted and expanded, so that they produce a kind of pumping forth. 8. If they should become concreted there would be no sense. 9. This appears especially from sneezing; indeed from catarrhal effects, and from many phenomena. 10. The cribriform plate is the center and fulcrum of the whole brain, for thither each membrane returns as to its own first and higher form. 11. There the sinuses of the *dura mater* begin and terminate. 12. There are found the falciform productions of the *dura mater*. 13. There the internal carotid communicates with the external. 14. There the convolutions of the brain converge as to their own first and ultimate; there is the station of quiet of both hemispheres of the brain. 15. There indeed preferably all the fibrous or medullary maniples are terminated and converge into the mammillary process. 16. This is especially the case with its more open passage. 17. Whence those processes are so tumid in the hollow orbits; being inflated they expand the whole medulla of the brain; 18, trembling now taking place, which pervades the continuous and fluid parts, and alternate constriction and expansion taking place, the effect surely follows, namely, that the fluid is drawn thitherward. 19. Neither are there elsewhere places of discharge not yet discovered, nor

veins which imbibe. 20. There are then cavities among the membranes, between the furrows of the convolutions; among the fibres passages greater and smaller; and these last are always moist, sometimes tumid with stagnant ichor, as in many diseases. 20. This can by no means be explored by experience in dead [collapsis] brains; many causes hinder. 21. That pituita is of a three-fold kind: that which is between the membranes, that which is between the *pia mater* and the fibres, and that which is between the fibres. 22. For each kind there are in the nostrils certain passages and determinations; 23, namely, between the double plate, or the periosteum and the pituitary membrane, through the cellular texture of the pituitary membrane, and finally between the fibres themselves. 24. For ducts lie open between the membranes, which pierce the pituitary membrane, in abundance. 25. Thus it is to be affirmed, that this lymph does not flow immediately into the nostrils, but from the interior outwardly, between the membranes, through the purer cellular texture, etc. 26. That lymph is of a nobler nature, wherefore it is reabsorbed by inspiration, is collected into vapors and again carried in, then also it is absorbed by the veins, nor does it easily turn into mucus, unless there be a diseased state.

**93.** *It likewise clears the lungs of pituitæ.* 1. For tickling in the nasal openings strikes deeply [*per condit*] into everything that is appended, as tickling of the palate does in regard to the stomach. 2. This tickling is continued through the whole trachea (see A. K., Part II); this becomes evident from sneezing; 4, as also from the harmony of the motions of the brain and of the lungs. 5. What excites one excites the other; the air itself excites the lungs, and its effluvial parts excite the fibres. 6. This appears still better in insects where the lungs commingle with nerves.

**94.** *The sense of smell and of touch in the nostrils purifies the blood of the external carotid, and thus draws off the pituitæ from the blood which is about to go forth to the brain.* 1. It is known that the external carotid has five branches, and that the glands draw off the salivas and pituitæ for the sensory organs, as has been observed above. 2. The nasal crypts especially, and the mucous membrane which according to Vieu-

sens is supplied with infinite arterial ramifications, perform these functions. 3. The extent of that membrane is vast; it is spread over the palate, the œsophagus, the trachea, and the brain; 4, and by means of the fibres it is conjoined with the *dura* and the *pia mater* of the brain, to such a degree that it is a membrane of very great extent. Since every particular refers to a general, therefore how far smell and that sense does this is evident from the following: for every tremor and modification courses through every continuous thing, thus upward and downward in the same manner; and since the nose is the principal axis of the œsophagus and the larynx, as also the fulcrum of the brain and its cranium; 6, therefore from thence as from a centre goes forth the radius of modification, in order that this sense may represent as it were the beginning of the vital activities of the body; all things of the periphery when the sense itself of the nose is in the centre. 7. Each sense, or smell and touch, acts its own part, and joins its work to that of the other; the one adds something local, the other modifies; each exists at the same time, and one promotes the other. 8. Parts of this membrane are adapted to each sense; the larger filaments, the ducts, glandules and papillæ are active; the cartilages, bones, etc., are passive. 9. Wherefore each sense strikes every artery and vein, and thus sends the blood into circulation, for the blood runs to its extremes, and thus unburdens itself. 10. There are arteries placed, as it were, starwise, so that from their mechanism (as in the kidneys) they put off the pituitæ from themselves. 11. Thence comes the mucus of the nostrils when the more fluid parts are drawn off. 12. This pricking and friction effects, as is evident from diseases of the blood [*hematics*], and from other things: something similar takes place by the puncture of washing parts. 13. Thence it becomes evident what snuff does, and what other spirits of diverse kinds which excite the fibres, do. 14. The blood also is urged forward that it may perform its swift circle in the veins, and return purer. 15. That sense gives a determination towards the lower parts in the uvula, and outside the nostrils; for it moves the whole membrane according to that flux.

95. *The sense of smell also purifies the eye of pituitæ.* 1. For this sense is the nearest neighbor of the eye; there is only

a little bone which separates the orbit. 2. There are interpassages and plates between the nose and the eye. 3. Furthermore there is the lachrymal sack, existing in brutes, and many blind crypts, which are yet porous, although they will not admit a stylus. See Winslow. 4. It purifies the eye in three ways: in the first place doubtless it draws off the superfluous pituitæ. 5. In the second place, it proceeds to the brain and strikes the beginnings and excites them into a tremor, and also the fibres, wherefore it sets the fibres, especially the optic fibres, in order. 6. In the third place also, perhaps by blind ways, by the arteries, by the membranes, it approaches the optic nerve itself and the substances of the eye, and thus also sets them into their order, by modes similar to those mentioned in regard to the fibres and minute things of the brain; the neighborhood and communication, then also the effects, induce this. 7. The external carotid seems to transfer its cleansed and pure humors rather to the eye than to the brain, and this indeed by the membranes of the arteries, which thing is to be further inquired into. 8. The tremor and modification proceeds especially to what is most minute, and indeed penetrates those most minute parts themselves, because they are most nearly neighbors. 9. In order that we may know what conduces to the eye, we will say this: it will be that which moves each of its senses, namely, smell and touch; these mutually correspond to each other, and the things thus moving will be harmonious with their very forms; this experience alone detects, for what harmonically touches each of its senses that is the best; 10, perhaps as also the finest spirit penetrates this also will penetrate thither.

**96.** *The sense of smell also purges the ear.* This is done, 1, by the extraction of the pituitæ from the arteries penetrating thither; 2, by means of the Eustachian tube. 3. These things are done in order that a tremor may pervade that tube, for it is membranous, cartilaginous and bony. 4. Thus the tremor goes directly thither, and strikes those parts which inhere in the membranes. 5. But the tube is situated at the palate, or at the interstice of the nostrils and the palate, in order that taste, and especially its tremor, may give forth its effect. 6. Thus in a multiplex mode the sense of smell purifies, whence its use is very great.

# SWEDENBORG'S SUMMARY OF THE PRINCIPIA.[1]

ENTITLED IN THE ORIGINAL LATIN.

*"From my Principles of Natural Things."*

## CHAPTER I; THE MEANS LEADING TO TRUE PHILOSOPHY.[2]

1. If the mind (*animus*) be well connected with the organs of the senses, that is, if man be truly rational, he will continually aspire towards wisdom. 2. The sign that we are willing to be wise is the desire to know the causes of things, and likewise that we desire to know the mysteries of things and unknown operations. 3. He who wishes to attain the end should also wish to acquire the means. 4. The means which lead to a knowledge truly philosophical are especially three, namely, experience, geometry and the faculty of reasoning. 5. By philosophy is here understood the knowledge of the mechanism of our world, or of whatever in the world is subject to the laws of geometry, or which it is possible to disclose by experience, assisted by geometry and reason. Under the government of geometry are its three kingdoms, the mineral, the vegetable and the animal, and a fourth may be added, namely, the elemental.

5. Under the government of geometry, and under the mechanical laws of motion, the whole mineral kingdom, as well as the vegetable, may be ranked; and even the animal kingdom in respect to mechanical organs, muscles, fibres and membranes; or in respect to its anatomical, organic and vegetative relations. 6. It is a great task to explain philosophically the most secret nature of the elementary world, which is most remote and deeply hidden from the scrutiny of our senses. 7. By experience is meant all the knowledge of the things which

[1] With this issue of the *New Philosophy* a portion of Swedenborg's unpublished manuscript *"Ex Principiis rerum naturalium meis"* is presented in an English translation; a critical and bibliographical review will be printed in a future issue.

[2] The material for Chapter I has been supplied from the *Principia* by the translator.

exist in the world and may be approached by our senses, whether they be in the elements, or in metallurgy and chemistry, whether in botany, anatomy, or other [sciences], if only it may be known by the senses how they operate on the sensual plane, or act *a posteriori.* 8. The inquiry into the secret and invisible things of nature need no longer be deferred. 9. For the knowledge of natural things there is no necessity of the innumerable phenomena, which some think are necessary. 10. In the state of ignorance in which we are at the present day we can become wise only by experience. The knowledge of metals and chemistry I wish to especially emphasize. 11. The reason that men are able to grow wise by experience and refer objects to some reasoning faculty and investigate them and present them distinctly is that they have an active and most subtle principle or soul. 12. All perception passes through connection by what is contiguous from a grosser medium to one which is more subtle. 13. We ought to be instructed by the senses; only by that which passes through experience to the mind (*animum*) can we attain knowledge and thus become wise. 14. Man is developed by the exercise of his faculties, and the very organs which mediate between the senses and the mind (*animum*) are formed by continual culture, and without such culture and use those organs would be closed, as it were, and consequently man would become similar to a brute. The slowness of his growth from infancy to manhood contributes in an important and essential manner to the forming and opening of such organs or motions in the most subtle membranes. 15. Although we grow wise only by experience, it does not therefore follow that they are the wisest who are the most experienced, or retain many things in the memory; but I affirm that they may become wise, and that experience is the medium which leads to wisdom. 16. Consequently, he who retains all the natural experience of the world laid up in the store house of the memory is not on that account a philosopher, and capable of knowing the causes of things, and of reasoning *a priori,* unless he knows how to digest all things analytically by geometry and rational philosophy; and unless there be present the faculty of reasoning philosophically, which consists in a certain situation and figure of the organs, as connected with the rational

faculty, produced by continual cultivation and use. Thus he may first become a philosopher, penetrate into the causes of things, and finally speak from causes by means of experience. Hitherto we have treated of the first medium leading to philosophical wisdom, or to the knowledge of the mechanical or organic world; let us now proceed to the second. 16. The second medium leadiug to wisdom, by which the arcana of invisible nature may be unlocked or revealed, is geometry and rational philosophy, by which we may weigh experiments, analytically digest them, reduce them to laws, rules and analogies, and thus arrive at a third or fourth deduction which was at first unknown. 17. The world itself, elementary as well as mineral and vegetable, and also the animal anatomy, is purely mechanical; geometry therefore accompanies the world from its first origin or from its first boundary to the last. 18. Since all things in the world, which move and have limits, are mechanical, it also follows that the least natural things, as well as the greatest, flow in a mechanical manner, and that the least, as well as the greatest, are actuated by a similar mechanism. From these considerations it may be concluded that a mechanism governs the animal body, and that in the least animal there is a mechanism which is similar to that in a large animal and in the greatest. In the least or smallest things there is a purer mechanism and one which is more conformable to rules than in those which are great and much compounded.

19. Since nature operates in the world in a mechanical manner, and the phenomena which she presents to our senses are subject to their proper laws and rules, it follows that nature cannot operate mechanically except by contiguity and connection; so that the mechanism of the world consists in contiguity, without which neither the world nor its mechanism could exist. 20. The mechanism of the world is natural to some men and animals, or is familiar to them by nature without an instructor. 21. Although the world is mechanical and consists of finite things which have arisen by means of the most various contingents, and though the world because it is such and may with the help of geometry be explored by experience and the phenomena which are in it, it does not therefore follow that all things whatsoever that are in the world are subject to the

government of geometry. The infinite cannot at all be explored by geometry, because it exists as a cause before there is geometry. There are also many other things, which, although they originated from the Infinite as well as the world, have not yet been discovered by geometry or rational philosophy, as, for instance, that intelligent principle which exists in an animal, or the soul, which together with the body constitutes its life. There is a Providence in things, which is infinite in the Infinite or in that which is provident in the highest degree and hence there follows a connection and series of consequents (*fatorum*) according to which all events by means of causes and the causes of causes are as it were determined and disposed towards a certain end. 22. Since the intelligence in the soul is not mechanical, but only the mode by which it operates, there arises the question, what is that in the soul which is not mechanical and what is its verimost rational and intelligent principle which is not subject to known laws? The rational quality in the soul is the continual analysis of those things which are in a similar manner scientifically inherent in its organs. Let these statements suffice concerning the second means of arriving at a mechanical knowledge of the secret things in nature; we now come to the third means or to the faculty of reasoning. 23. The third means by which we may arrive at a true philosophy in cosmology and the knowledge of the secret things in nature is the faculty of reasoning. The faculty of reasoning justly, and of arriving at the end in view by the proper means, which are experience and geometry taken in a wide sense, is the characteristic of the rational man. A like faculty of reasoning is not given, and at this day cannot be given, to all. 24. But in order that it may be clearly understood what and of what quality the faculty itself ought to be, it must be grasped that the sciences and experience should be so disposed and harmoniously diffused through the organs, that immediately, when that which is active or an active force approaches, all those things so disposed in the organs which are of a similar nature should tremulate and as it were run to meet it and as it were present themselves to the soul simultaneously; but not together with others except as it were in obscure connection. The case is not different than [the law which obtains in the following illustra-

tion]: If a hundred chords be equally tuned upon a lyre [1], when one chord is moved or sounded, all the others tremulate without there being any contact and as it were concur in the same sound and present themselves together to the ear in concord; from these premises it follows that we are wise in proportion to the things retained in the memory. 25. If experiment and geometry be called to our aid, I have no doubt, under the auspices of such leaders, of arriving at some knowledge of the invisible things of the world. 26. By a true philosopher we understand the man who, by the means which have been mentioned, is able to arrive at the real causes, and the knowledge of those things in the mechanical world which are invisible and remote from the senses; and who is afterwards able to reason *a priori*, from principles and causes, concerning the world and its phenomena, as well in physics, chemistry and metallurgy as in all other things which are subject to the government of mechanism. Were it possible to bring to light elementary nature, afterwards that of metals, then that of the vegetable kingdom, and finally that of the animal kingdom, what fruitful advantages the world would reap! 27. No man seems to have been capable of arriving at true philosophy, since the age of that first of mortals who is said to have been in a state of the most perfect integrity, that is to say, who was formed and made according to all the art, image, and connection of the world, before the existence of vice. The reason why man in a state of integrity was made a complete philosopher was that he might the better know how to venerate the Deity, the Origin of all things, that Being who is all in all, for no one can be a complete and really scientific philosopher except he be most devoted to the Diety. True philosophy and contempt of the Deity are two opposites. Veneration for the Infinite cannot be separated from philosophy; for he who thinks himself to be wise, unless his wisdom teach him to acknowledge the Divine and the Infinite, that is, he who thinks he can be wise without a knowledge and veneration of the Deity, is not wise at all. 28. They therefore are mere children, and have scarcely reached the first threshold of true philosophy, who ascribe to nature

[1] The strings of a piano also afford an apt illustration.—Tr.

the origin of all things, to the exclusion of the Infinite; or who confound the Infinite and nature, when yet nature is only something which has been caused, or a *causate,* the Infinite being its efficient and cause. 29. True philosophy does not derogate from [the credibility of] miracles, for all things are ascribed to the Divine Omnipotence, as that the world came into existence, which took place by contingents and mutations (*vices*). 30. I will present the two states of man, first, that which was of the greatest integrity and perfection, afterwards that which was perverted and imperfect. 31. It may be conceived that when man was in a state of the greatest integrity and perfection there existed such a state of contiguity [throughout his system] that every motion proceeding with a free course from his grosser parts could arrive, through an uninterrupted connection, to his most subtle substance or active principle, there being nothing in the way which could at all impede. 32. In the perverted and imperfect state of man in which we live today we see that nothing can be investigated without means, that nothing can penetrate to the ultimate active principle or soul except by means of continual experiments, by the assistance of geometry, and by the faculty of reasoning which is thus acquired. 33. The more profound his wisdom, the deeper will be man's veneration of the Deity and consequently his love of the Deity. Primevally his delights wholly terminated in the love of God, a love which exhausts and replenishes all sense of delight. It may therefore be most reasonably inferred that the delights of the first man consisted in this, that the end of the delights which he derived from the contemplation of a world so perfect and pleasing left for the use of himself and his hereditary posterity, and from the agreeable perception, by means of his senses and organs, of the motions existing in all the elements, was the love of the Deity. Supreme veneration and supreme love of the Deity could not exist without the supreme worship of Him. Therefore, the wiser a man is, the more will he be a worshipper of the Deity. From the same reasoning it also follows that such a man God must have loved supremely; for love is not only reciprocal and according to connection, but is also greater in what precedes and less in what follows. 34. The contrary to all this must necessarily take

place in a man not in a state of integrity and in whom the above mentioned connection has perished and therefore the Infinite and Only Begotten was made man that He might restore to man the connection with the Infinite in Himself and consequently by a certain connection with Himself in those who are like Him.

## Chapter II; the first natural point.

1. *Concerning the first simple of the world.* There is a first entity produced by the Infinite. Nothing finite can exist *per se;* therefore, it must exist by means of that which can finite [or produce what is finite], and which is Infinite *per se.* Therefore composite things derive their origin from simples, simples [derive theirs] from the Infinite, and the Infinite from itself, which is also the only cause of itself and of all things. All finite things came into existence successively, for nothing can be at once what it is [capable of becoming] except the Infinite. 2. Geometry itself acknowledges a certain simple and first entity of its existence which it calls its own or mathematical point. 3. The Holy Scriptures also wish to instruct us in this, that the world was created by God and the infinite. 4. Rational philosophy does not acknowledge that there can be an *esse* or *existere* without a mode. 5. And if [the first simple] was produced by motion from the Infinite, it must also be supposed that in the Producer there was a will (*aliquid velle*) which produced. The simple is the first entity existing by motion from the Infinite, and thus, in regard to existence, as it were a medium between the Infinite and the finite. 7. This point is the same as the mathematical point, or the point of Zeno; it is called the natural point. 8. The point is a simple and most simple entity, than which nothing can be more simple, since what is simple admits of no degrees. It [the point] is in no respect compounded, nor finited, nor limited, because it is simple, unless it may be said to have only one termination or limit. 9. Since there is [only] one limit, it follows that it [the point] is the first entity and seed of finite things. 10. [The point] is a kind of medium between the Infinite and the finite, for it is by the mediation of this point that finite things exist from the

infinite. 11. This point is immediately produced from the Infinite. 12. This natural point is purely motion in the universal Infinite, and consequently it is pure and total motion, which cannot be conceived of geometrically. 13. This motion presupposes no substantial, by (*per*) which it may be said to exist. In what way, therefore, are we to conceive of this purity and totality in motion? I reply that it cannot be otherwise conceived of geometrically and rationally than as an internal state or endeavor (*conatus*) to motion. Thus [in composite substances] we have first the motion of the individual corpuscles (*singulorum*), then the state of all together or the internal state, and thus the endeavor (*conatus*); therefore in what is simple there is motion, internal state and endeavor, etc. 14. This point cannot be conceived of as extended; it is without parts and indivisible. 15. Neither can it be said to fill space, unless it be space simply understood. It cannot be said to have figure, unless figure be simply understood. 17. Figure thus conceived of is most perfect. 18. In respect to quantities, or geometrically [considered, this point] is as it were nothing, or eludes the imagination. 19. Nothing can be attributed to this point, which is attributed to what is composite, unless by analogy.

20. Within its pure and most perfect motion are all those [qualities], as well active as passive, which limit (*finiunt*) finite things, and by which they are finited (*finiuntur*) throughout all their series. 21. Since this motion is endeavor (*conatus*) towards motion, or pure motion, the figure of its motion must be most perfect; if most perfect, it must be altogether similar to the circular figure; if the circular figure is the most perfect, it must be perpetually circular, or spiral; the motion must be similar to a perpetually spiral one; therefore this motion must have its centre in conatus and it must have a periphery. Therefore it cannot be said that such motion flows from the centre to the periphery, unless it be added that it is in the centre and in the periphery in the same instant, and thus everywhere present in its space instantaneously. 22. From the mechanism and geometry of the internal spiral motion there results, first, a certain axillary motion; then a progressive motion of all the spires around their poles; and from the axillary

and progressive motions, if there be full liberty and no contact, another or local motion, and indeed [a motion which flows] into perpetual surfaces. 23. Nature, which is a motive force, neither wishes nor is able to flow into any other figure of motion more freely than into the spiral; by which figure also its whole celerity is conveyed with the greatest freedom and facility through all its degrees; and to which, likewise, it appears to have applied all its mechanical force (*vim*) and power (*potentiam*). 24. Motion is the only medium by which anything new can be produced. Motion itself, which is only a quality and mode, and not substantial, may yet present what is substantial, or a similiarity to what is substantial, if something substantial be put into motion.

## Chapter III; Concerning the first or simple finite.

1. From the points or simples treated of in the preceding chapter there is produced this simple finite or first substantial. 2. Nor can any finite arise from points except by means of motion among the points. 3. But the cause of motion must be in the simple or point itself, that is, in the very internal motion and state of the point. 4. This new motion or motion of the points among one another, and their state, must necessarily resemble a pure motion, or the internal state which is in the point; that is, [this new motion must itself] also be spiral. 5. [The first finite] is the first entity or simple finite existing from the motion of the points among one another, and is thus the first substantial of all the finites. 6. [The first finite] is also the least substantial. 7. There is no other substantial in the world except this finite. 8. The least [substantial] is geometrical; it is limited, but limited by least or very small boundaries. 9. It fills space, but is the least among the finites, or [it is such that] a smaller than it cannot be supposed. It is endowed with figure, but figure in its least boundaries. 10. Its figure is the most perfect of finite figures. 11. The figures of such finites are most similar [to each other]. 12. [This finite] arose by means of the motion of the points among one another. 13. The kind (*ratio*) of motion among the points, which forms this finite, is, in a certain respect, similar to the kind of motion

in the point. 14. This finite possesses in itself the same active force as the point, so that it may produce the following and more compounded finites; that is, it receives from the point the force of finiting the sequents. 15. Thus the first finite likewise enjoys internal motion as does the point. 16. This simple finite must be compounded by means of a motion among the points. The points finally settle into a position (*situm*) in agreement with their motion and figure, and that position, thus formed in motion, derives its similarity [to the point] from the motion, figure and space of the points, likewise its quality and power of moving itself further. 17. This finite, in regard to its substance, is the first boundary of all the finites; as to motion, it is the first ratio of celerity; and all the analogies among finites cannot be reduced to a smaller boundary or ratio. 18. In comparison with [things] much finited and compounded it is as it were nothing, but nevertheless it is a something and a finite entity. 19. It may be concluded *a priori* that the motion and position of the points among one another thence arising in similar to the internal motion and state of the point, or that it is a spiral reciprocating from the centre to the periphery and from the periphery to the centre. 20. If the continual motion be spiral it must also be reciprocal from the centre to the periphery and *vice versa*. 21. From the motion of the points arises the constant position of all; consequently, that in the finite by motion and position there arose two poles, the one opposite to the other; and the poles are formed like cones. Likewise, in every finite entity, whose parts are disposed into the spiral figure, there are an equator, ecliptic, meridians and other perpendicular circles. 22. From the regular position of the parts in a spiral figure there is a general endeavor (*conatus*) of all towards one and the same general motion, and that endeavor, if there be nothing extraneous to impede it, causes a general axillary motion or a circumvolution of the finite around its polar axis. 23. From the endeavor of all towards motion there exists a progressive motion of all the parts and spires which is much slower than the general or axillary motion, in which motion there is preserved a similar position and the same figure of all [the parts]. 24. Therefore all primitive force in the point and also the derivative force in the sequents consist in

this: that the motion, state and endeavor in the point is towards the spiral figure, which motion, state and endeavor cause an axillary and likewise progressive motion, which together produce another or local motion in which consists the very active force of finding and compounding the sequents and of so modifying them through a long series in the manner in which we perceive by means of our senses that the world [is modified]. 25. The motion of all the points must be most similar and regular, likewise the progressive motion thence arising, and also the second [or local] motion. [26. The principles can be but little proved by experience until we have arrived at the elementaries.] 27. Without a connection, similarity and derivation of one cause into another nothing natural could be produced.

### Chapter IV: Concerning the second finite.

2. Since there is one kind of finite in the universe and all the finites are similar to each other, this therefore is the only [kind of substance] which can procreate anything from itself. 3. Nor can [anything procreated] derive its origin from the more simple and only existing finite except by means of motion. 4. Nor can motion be conceived between the finite substantials unless its cause be conceived at the same time, therefore the very cause must be in the substantial itself. 5. But the cause cannot be efficient and present a causate unless there be a contingent [which is this], that the series and abundance of these smallest substantials is so great that one is in contact with another. Therefore we can conceive of only two contingents, either that the abundance of the least substantials is so great that one by contact presses upon another, from which contingent exists a new finite, or that the abundance of least substantials is not so great that one presses by contact upon another, a contingent from which exists the active of the first [finite]. 6. It is a second finite entity, which exists from the motion of the simple finites among one another, and is thus the second substantial of all the finites. It came into existence only by means of motion; it is motion which distinguishes, finites, configurates, makes one thing equal to another, retains it within its limits and so binds it together that it may exist as one

finite ens capable of being separated from another. 7. [This finite] consists only of simple finites. 8. It is not divisible into lesser [parts] than the simple finites of which it consists. 9. It is the second geometrical entity, limited, but in very small boundaries, and there can be no smaller finite than it, except that first substantial of which it consists. 10. It is endowed with a figure similar to that of the first substantial. 11. Its figure nearly approaches the most perfect figure of the finites, but it is not the most perfect. The figures of all these finites are similar, but, nevertheless, there may be dissimilarity among them. 12. The internal motion, position and state of this point are similar to the internal motion, position and state of the first substantial. 13. The motion of the whole, or the general axillary motion, likewise the motion of the parts, or the progressive motion, as also the second [or local] motion, if there be opportunity for it, are similar to the general, progressive and second [or local] motion of the first finite. From these things it follows that the position and progression of the centre of gravity in this second finite is such as is the position and progression of the centre of gravity in the first finite. 14. The celerity of the second finite, as well in regard to its general motion as in regard to its progressive and local motions, is less than the celerity of the first finite. 15. The first ratio of celerity is in the motion of the first finite; in the second finite is the second ratio, and this finite in regard to substance is the second boundary. 16. In itself and in its own internal state and motion it possesses the same force and quality as the first substantial, so that it is able to finite and produce the succeeding and more compounded finites, that is, it has received its whole force of finiting the succeeding [finites] from the first substantial, but, nevertheless, this force is no longer that of the first substantial, so as by it to be able to finite, but that it is its own, proper and acquired. 17. In respect to things much finited and compounded, it is small and as yet scarcely comprehensible geometrically. 18. That the motion in the point is spiral cannot be concluded from geometry but only from reason, but in the motion and position of the sequents the geometrician, as well as the physicist, may see that it is spiral. In the lever mechanics sees its power and forces; in the inclined plane its motion; in the perpetual lever

a perpetual power; in the perpetually inclined plane perpetual motion; in the spiral figure which represents both it sees all its possibilities and capabilities. If the centre of gravity consist in motion, so that the centre is itself formed by a continuous and most regular motion, mechanism teaches that such a body in motion will move still further, the motion being directed by the centre of gravity. If therefore this centre of gravity be not the centre of a quiescent body but the centre of some motion, it immediately becomes lively and active, or that becomes a living force which in a quiescent [body] is dead and inert.

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## ON THE CAUSES OF THINGS.[1]

1. *On the equilibrium of the planets.* If a ball, which is heavier than water, be swung around in water, it runs out from its centre of rotation; if it be lighter [than water] it runs in; if of like weight it swings evenly and neither out nor in. This seems to be the case with the planets in the air, in like manner as a hollow lead bullet can be made to float on water.

2. *The most universal matter.* The particles which are in the ether must be round; thus also the other [kinds of] particles. The more the particles make room between each other and inside of themselves, where there are still other smaller particles, and between these still smaller ones, and so on to infinity, thus [it follows] that the most universal matter must be infinite or rather indefinite.[2]

3. *On the origin of matter.* In the first creation there was a considerable contention between fire and water, so that from the compression of both there arose from the latter salt and from the former sulphur; and when they still further compressed each other the sulphur became oil and the salt a flowing glass. The sulphur by its compression was finally turned into an earth and whirled out as pure fire.

4. *On rain; the rising and falling of water [in the atmos-*

[1] A few remarks in consideration of this translation of Swedenborg's paper *On the Causes of Things* will be found on pp. 206-8 of the present issue of *The New Philosophy*, together with critical and bibliographical information.

[2] The sentence appears to be incomplete.

*phere*]. If fish-bladders be balanced [in water] so that they neither float nor sink, if in luke-warm or warm water they float, but if it become colder they sink; in like manner if they lie at the bottom [of a vessel] and the water be poured off they float upward. [Or in other words the case is] thus, namely, when the water is at its first [degree of] coldness the bladders are balanced; but if more water be poured on, when they stand a little [raised up] from the bottom, they immediately fall downward; for as the bladders become more and less compressed they change their weight in relation to the water in like mass and quantity. The case is similar with the particles of water; for as long as the ether expands them by the warmth and rays of the sun, so that they become much larger than they would otherwise be of themselves, these particles of water float upward into the air no otherwise than a hollow lead bullet in water; but if the atmosphere be too high and consequently produces a stronger pressure, on account of which the particles of water cannot reach their full size so as to be able to balance themselves against the air, the water must remain near the earth; but as soon as the height and the pressure reach their maximum, which the water strives after because of the warmth of the sun, it immediately goes upwards, and when the quantity up in the air collects, nothing else can follow than [that it will find] a way backward, and as long as the lower height of the atmosphere allows the upward course [of the water], so long changeable weather of rain and sunshine continues in alternate succession, all according to the greater and lesser height [of the atmosphere].

5. *Experiments.* If by means of a lamp small glass bubbles, like hazel-nuts or peas, be blown rather thin and of an oval shape like fish-bladders, and they be balanced with lead in water in like manner as before said, and be placed in the midst of water in a bottle or glass,—then it can be noticed that if the glass be further slowly filled with water so that the upper part which is above the bubble be increased, or, rather, higher than it was before, the bubble sinks to the bottom; but if the water in the upper part be diminished, it floats upwards. The reason of this is that the deeper the bubble was under the water the more it was compressed and consequently lost its balance

in relation to the water. That a greater depth produces a greater pressure can be proved by this, that when you tie a stone to an empty four-sided glass bottle securely screwed tight and sink it by a cord into the sea, it will be found that in the beginning and at a little depth the bottle will safely hold [together], but if it be sunk too deep it goes to pieces, so that one has only left the screw and the string; and then [it also follows] that according to the strength of the bottle it endures a greater or lesser depth before it breaks. This is also the reason that divers who go under water cannot endure a (—) greater depth than their bodies allow in the water fall.[3] This is also the reason why sick fish which live at the bottom of deep water cannot float upwards, as those do which live up in shallow water.

6. If a number of fish-bladders be taken and trodden asunder, or, rather, if a little hole be punched in each with a fine needle and the air be pressed out so that they become altogether empty, in so far as can be noticed, and they be put in cold water or in a pot or kettle, they immediately sink to the bottom; but as soon as the vessel is placed on the fire so that the water becomes warm, these same bladders float up from the bottom. The reason is that the little air which is still left and not sufficiently pressed out expands itself and increases in size on account of the warmth and then soon carries the bladders up with itself, provided that the air be not too light [in weight] or slip out through the small holes which are pressed together. For the same reason it is that vinegar and all other liquids which contain any impurity form a scum when put on the fire.

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## REMARKS ON SWEDENBORG'S PAPER "ON THE CAUSES OF THINGS."

THE short paper by Swedenborg, entitled "On the Causes of Things," of which a translation is printed in the present issue of *The New Philosophy*, pp. 204-6, belongs to the first period of his life as a scientist and philosopher. It is of unusual interest to the student of his science and philosophy be-

[3] The sentence is faithfully translated, but is not clear. Perhaps the word for "divers" in the original should be read otherwise.

cause in it, perhaps for the first time, are to be found the conceptions of cosmology and the constitution of matter which occupied his attention for so many years and which are finally presented in their mature and complete form in the *Principia.* The paper "On the Causes of Things" is one of the first of that long series of documents which show how, on the basis of experimental research, the *bullular hypothesis* was gradually developed in all its parts.

In number one we find the idea that the planets float or are balanced in an atmosphere, a subject about which much may be found in the *Principia.* In the second number is found the familiar concept of the later period that "the particles which are in the ether must be round," likewise the "other particles," and that both surrounding them and within them there must be degrees of still smaller particles, so that "the most universal matter" is said to be "infinite or rather indefinite." In number three may be traced the idea that the more inert and inactive substances were formed "in the first creation" by compression from substances which were more active and less inert, and in the remaining portion of the paper, which treats of the causes of rain and changes in the weather, may be found several interesting ideas and experiments.

*Critical and Bibliographical Information.* In the library near the cathedral at Linkoping (Stifts-Bibliotek) there is a large collection of manuscripts and among them some that were once the property of Ericus Benzelius. There is a folio volume (34 centimeters long and 21 centimeters wide, nearly) which, according to the catalogue, which was written later and placed in the beginning of the volume, contains 154 manuscripts by various authors and of various lengths and sizes. The volume is entitled *"Collectanea Physico-Mathematica, as well as several [papers] concerning the Natural History of Sweden, which were used at the foundation of the Literary Society of Upsala."* (Collectanea Physico-Mathematica, Sasom ock atsskilligt rorande Sveriges Natural Historia, Hvaraf gjordes bruk Vid Societatis Literariae inrattande i Upsala), and on the inside of the cover is written "xl. Bibliothecae Lincopiensis. Ex Donatione C. J. Benzelii." This volume contains a collection of Swedenborg's letters to Ericus Benzelius, his brother-in-law, and also a number of Swedenborg's early scientific papers and other material by or relating to him. The papers in the volume are numbered in lead-pencil and the one numbered "30" is Swedenborg's manuscript, entitled *"De Causis Rerum."* This document is a quarto leaflet of two pages, which, although somewhat irregular in

shape, are about 21 centimeters long and 16 centimeters broad. The pages are not numbered; they are almost completely covered with writing, nearly the whole of which is Swedish, but on the last page, on the right-hand side, about two-thirds from the bottom and written from bottom to top, are found the words "quicquid sit" in a somewhat lighter color of ink than that used in the manuscript as a whole; although Latin words are occasionally used in the text, the title of the paper being in Latin, these words appear to have no connection with the text, neither with the leaflet which follows in the volume; why they are there is a question. On page four, at the place which is indicated in the translation by a line, there is found in the original document a line with a point above and another beneath. The numbering used in the translation is not to be found in the original in every case, where only the numbers 2, 3 and 4 are to be found. The italicised summary of contents placed at the beginnings of numbers 1, 2 and 3 are written in Latin; those for numbers 4 and 5 are in Swedish.

The original manuscript of *De Causis Rerum* was reproduced by Dr. R. L. Tafel in the Photo-lithographs, Vol. I, number vii, pp. 24-27, together with most of the other documents by Swedenborg contained in the *Collectanea Physico-Mathematica.* Dr. Tafel includes *De Causis Rerum* in the Chronological Account, (*Documents,* Vol. II, pp. 890-891), where a summary statement of the contents is also given, and in Document 311, which may be found a few pages before the Chronological Account, (pp. 876-879), Dr. Tafel has also given a general description of the documents by and relating to Swedenborg which are contained in the volume of manuscripts preserved at Linkoping.

The writer did not work from the photo-lithographic reproduction, but from the original manuscript, which was forwarded from the library at Linkoping to the Royal Library at Stockholm.

In conclusion, the writer wishes to acknowledge the valuable assistance given by the Rev. J. E. Boyesen and the Rev. C. J. N. Manby, of Stockholm, in the transcription and translation of the manuscript.

ALFRED H. STROH.

Stockholm, Sweden, Nov. 18, 1902.

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## NOTE AND COMMENT.

We are fortunate in having secured for this issue of the New Philosophy translations of some of Swedenborg's MSS. which have not hitherto appeared in English, and are correspondingly indebted to the contributors of the same. Dr. Sewall's account of the recent meeting of the American Philosophical Association also deserves a careful reading.

The translation of Swedenborg's paper "On the Causes of Things" is of particular interest, as containing, if Dr. Tafel's chronology is

correct, the first written suggestions of Swedenborg's early philosophy that have come down to us. It is assigned by him to the year 1717. To Mr. Stroh's own comments we would add, what most students of Swedenborg's philosophy will readily see, that in the "contention between fire and water" which he speaks of in Sec. 3 is contained the first suggestions of that great duality of nature which so dominated his later philosophy, appearing in the *Principia* as a duality of actives and passives (or finites) and in the physiological and theological works as a duality of will and understanding.

Swedenborg's *Summary of the Principia* may be of interest to those who have not had time to examine the work itself, although it is alone hardly sufficient to give one an adequate idea of the *Principia* philosophy.

**Interest in Swedenborg' s Scientific MSS. in Stockholm:** Through excerpts from letters received by Bishop Pendleton from Mr. Alfred Stroh at Stockholm we learn with the greatest pleasure that an interest in Swedenborg's Scientific MSS. has been aroused among scientists in Sweden which gives promise of accelerating the publication of those papers considerably. The noted Dr. Retzius has become so impressed with their importance that at a recent meeting of the Academy of Sciences, at which many foreign scientists were also present, he moved the appointment of a committee consisting of "Drs. Arhenius, Nathurst, a well-known geologist and palæontologist; C. Lovin, ex-professor of Physiology, and Henschen, a famous pathologist on the brain," for a complete examination of the subject. The motion was unanimously carried and Dr. Retzius himself included in the committee. Dr. Arhenius is quoted as having said on a previous occasion that he believed Swedenborg to have been a greater scientist than Linnaeus.

There would thus appear to be some prospect that general scientific interest coupled with national pride may relieve the Swedenborg Scientific Association of a part of the burden which it has taken upon itself. At all events this interest, following so closely upon the utterances of Dr. Neuburger of the University of Vienna, are very suggestive and stimulating to those already engaged in the work.

The work of copying and collating is also progressing most satisfactorily. Mr. Stroh reports that "he has now collated over 1,400 pages of the Scientific MSS., that over 2,000 have been copied and that the work is now almost completed."

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**Prof. Macloskie on the Descent of Man:** Some time ago there was sent to us a clipping from *The Advance* for July 10, 1902, containing a presentation by Prof. G. Macloskie, of the Biological Department of Princeton University, of the current scientific status of the above question. This was taken from a long letter to the New York *Tribune,* and runs as follows:

"1. It is not the present doctrine of biology that man is descended from the anthropoid or any other division of apes. About eleven years ago it was discovered that the human foot cannot be derived from the anthropoid posterior hand, or from that of any of the monkeys.

"2. The next theory, that man is descended from lemurs, has also been abandoned because of the discovery that lemurs are not closely allied either to man or monkeys.

"3. In 1897 Hubrecht saved the tarsiids from being condemned along with the lemurs, and showed that Cope's Homunculus, a fossil skull of early date, belongs to the tarsiids, is a true primate, and may possibly be in the ancestral line both of monkeys and man. I believe he is still investigating his interesting thesis.

"From this it appears still true that (using the words of Claus, published in 1885) 'the view that man has originated from one of the lower forms of primates is only a deduction from the Darwinian theory.' It has not yet been verified, and scientific men are not yet able to formulate its whence or how. * * * .

"Under these circumstances it would seem premature to be readjusting our Scriptural notions so as to accord with scientific theories not yet even formulated. Scientific investigators are themselves calling a halt, which one of your contemporaries interprets as signifying that the whole case is settled; but they are at a stand in perplexity as to what will come next."

At the same time it must not be forgotten that the evidence given is purely negative. Existing species are supposed to represent tips of boughs and twigs on nature's genealogical tree, each occupying its own space and growing away from the others, not towards or into them. According to their own theory evolutionists would only expect to find representatives of animal ancestors in the fossil state. This must be kept clearly in mind, if we are to value Prof. Macloskie's remarks properly.

It seems to us that the doctrine of evolution should occasion believers in the supernatural, much less annoyance, than some theories not so often referred to. One of these is the belief that certain organs or parts of the body are "useless." This appears to be closely bound up with an idea popular, by implication at least, with one class of scientists that man was not designed, but only "happened." If it is really true that certain portions of our physical make-up are absolutely useless, not to say detrimental to our existence, it follows that we know a better way of constructing human beings than the present plan. Such being the case birth and growth are not under the care of an active Agent greater than men. Men thus become either coexistent in time with and independent in power from all other minds or are themselves the greatest minds.

We must be careful, however, not to confuse a "functionless" with a "useless" condition. Organs may degenerate and lose their original

functions, but, so long as they are retained, we cannot believe them to be absolutely useless to the individuals in whom they happen to occur.

Of course in the modern and sadly disordered condition of mundane affairs when marriages are often contracted with little regard for mutual fitness and slight thought of future responsibilities, and when unhealthy modes of life are rather the rule than the exception, it is not to be wondered at that weak congenital organizations and even malformations are alarmingly common. It is poor logic, however, and worse science to charge such results on the inherent defects in the human organism. More probably one sees in them a desperate struggle of Life to overcome meddlings with nature little short of criminal.

Just how the much-mooted question of the function of the vermiform appendix will be settled we do not pretend to suggest. It is, however, noteworthy that several organs once supposed to be functionless are now recognized to have distinct uses.

Dr. Minot, of the Harvard Medical School, in his presidential address before the American Association for the Advancement of Science at Pittsburg, June, 1902, referred to some of these as folloys:

"Now, the more we have learned about animals, the better have we appreciated the fact that in them only such structures and functions are preserved as are useful, or have a teleological value. Formerly a good many organs were called rudimentary or vestigial and supposed to be useless survivals because they had no known function. But in many cases the functions have since been discovered. Such, for example, were the pineal gland, the pituitary body, the supra-renal capsules and the Wolffian body of man, all of which are now recognized to be functionally important structures. Useless structures are so rare that one questions whether any exist at all, except on an almost insignificant scale."

How growths, seemingly the most inconsequential, may serve a very important use is well illustrated in the case of certain protuberances found on the backs of reptiles. These really represent the rudiments of dermal outgrowths or hairs which came into active play when the animal was sloughing off its old skin. (See Carl Semper, *Animal Life,* pp. 19-23.)

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**The Ideal History of Physics Wanting:** Dr. C. Riborg Mann, of the University of Chicago, in an article in "Science" of Dec. 26, pleads for the still lacking history of Physical Science, which shall be based not on fragmentary inductions assumed as laws for the time being, but upon the progress of those ideals which in every instance lay behind the inductions. After asserting that if science "grows and develops" it must be an organism with life, he asks: "In what does the life of science consist?" And he proposes as an answer, "in the ideas and conceptions upon which the inductions and classifications of science are based." He adduces instances in Copernicus, Newton and Fresnel,

Faraday and Maxwell, showing that their theories were worked out by applying experiment to preconceived ideals, or to the laws lying really in the realm of the invisible and intangible, i.e., in an imagined rather than in a sensuously known sphere.

The same is eminently true of Swedenborg's theories in his *Opera Philosophica*. Because these treat of the laws of the invisibles and imponderables they are no less a part of science than "the ideas and conceptions" upon which the above-named masters of science based their inductions and classifications. It may indeed be that Swedenborg's theories in the *Principia* and the *Chemistry* will require longer and deeper experimental research for their application, but this in no wise discredits them until such research shall have proved them value-

According to Dr. Mann the true historian of physical science must be the artist rather than the artisan, using Carlyle's definitions of these terms. The artisan sees things apart from their relation to the whole; the artist views them in the relation. "The writers of physical history have shown themselves to be artisans rather than artists. They have failed to perceive that there is a whole, and that only in the whole is the partial to be truly discerned. It is thus evident that the discernment of the whole is beyond the attainments of the scientific historian. Its realization is reserved for some future historian and offers to him a most enticing and remunerative field."

To this excellent observation we would only add that in making this step from the viewer of the parts to the viewer of the whole the scientist will step upward from the plane of science to that of philosophy,—not leaving the science behind, but seeing all its results in their wider and ideal relation. He will then first see things and the laws of things not as a chaos of the disconnected and accidental, but in their Form. For as Swedenborg defines it a Form is that wherein all the particulars have relation to each other and to the whole which they constitute. In regard to the possibility of such an ideal history of science Dr. Mann hopefully remarks:

"Men are beginning to question more than ever the bases of scientific work, to look behind the principles and laws which lie on the surface and to inquire into the real nature of the ideas upon which their science has been founded." F. S.

## THE AMERICAN PHILOSOPHICAL ASSOCIATION.

The second annual meeting of this association was held in Washington in Convocation Week in connection with the meeting of the American Association for the Advancement of Science, the sessions covering the two days, Dec. 30, 31. The meetings were held in various lecture halls of the Columbia University, and were very largely attended, the philosophical faculties of nearly all the larger colleges and universities of the country being represented. Among those reading papers and taking part in the discussions were Drs. Ormond and Baldwin, of

Princeton University; Royce and Munsterberg, of Harvard; Ladd and Sneath, of Yale; Dewey, of Chicago; Cattell, of Columbia; Creighton, of Cornell; Hall, of Clark; Patten, of Princeton, and Commissioner Harris, of the U. S. Bureau of Education. Some of the meetings were held conjointly with the American Psychological Association. The papers covered a wide range of subjects and the discussions afforded a free criticism from divergent points of view. The main theories handled were Philosophy and Religion, Philosophy and Education, Philosophy and Science, the Psycho-Physical Parallelism, and the Psychological Classification of the Sciences.

The last-mentioned subject was treated of in a notable address before the joint meeting of the associations by Professor Munsterberg, who furnished his hearers with a carefully elaborated chart displaying a complete system of Theoretical and Practical Knowledge. What is noteworthy in this chart and appeals especially to students of Swedenborg's doctrine of life and mind is its trinal classification of Life, Truth, and Knowledge or Experiences. Life is described as the "immediate reality" felt "as a system of teleological experiences," or, as Swedenborg would say, it is Love willing its ends. Life embraces Volition, Thought, and Enjoyment (Swedenborg would say Delight); and this Thought is made, as with Swedenborg, not Life itself, but the "effect of Life." According to Munsterberg Thought is "Will acknowledging the connection of experiences." Swedenborg in *Divine Love and Wisdom*, Ch. I, on "Love is the Life of Man," says: "No one knows what is the life of man unless he knows that it is love. . . . If this be not known, one person may believe that the life of man consists only in feeling and in acting, another in thinking, when nevertheless thought is the first effect of life and sensation and action are the second. It is said that thought is the first effect of life, but thought is of different degrees interior and more interior, exterior and more exterior; inmost thought which is a perception of ends ("teleological experience") is actually the first effect of life." Munsterberg also classifies Knowledge under the theoretical and the practical, the first embracing knowledge of phenomena according to their relations and their purposes, and the second the application of this knowledge in arts and sciences. But throughout the entire chart the will-experience is the inmost and animating factor.

Professor Dewey in treating of the Psychological Method justified the appeal to experimental science. Energy he claimed to be the universal concept which may be translated into work, capacity, or even substance and cause. Feeling an object is merely experiencing a change of form; this is transformed into Psychic energy. Consciousness, which is absent in the energy of crystallization, begins in nervous energy. The world as thought is energy, a central nervous activity. Here was a reminder of Swedenborg's doctrine of Forms and Modifications or the changes of form and changes of State. [See *On the*

*Soul;* nos. 175-190.] "Affections are changes of state corresponding to the harmonies which flow especially into the sensorial organs." But the whole presentation was obscured by the failure to recognize the discrete degree between the natural and the spiritual.

Dr. Ladd in treating of the Psycho-Physical Parallelism seemed to interpret parallel as applying to things on the same plane or degree instead of applying to two discrete degrees between which there is a correspondence and a relation of cause and effect, which is Swedenborg's doctrine. Hence his objection to the popular doctrine seemed to lie in its confusion of things which are distinct. The great forever discrete existences are the Ego and its embodiment, a mind and body, and Dr. Ladd defines "cause" as the action of mind on body. What is wanted is the bond to connect the two. Swedenborg says this bond is that of correspondence of form and influx of life from higher to lower. Dr. Ladd goes only so far, although this is a significant step, as to find this bond in the cosmic order itself, and its only explanation in religion; which we interpret to mean the recognition of the cosmic order as the Divine Will and Intelligence controlling all nature and all life.

Professor Creighton in discussing the paper of Dr. Dewey denied that End can be found by physico-psychological experiment, in so far agreeing with the doctrine of the discreteness of degree between spirit and matter. The end which shapes all purpose cannot, he contended, be discovered by psychological experiment or study. President Stanley Hall pleaded the merits of experimental psychology, instancing the modern methods of Child-study in their behalf, but he failed to point out any special contribution of value from this study.

Professor Hibben, of Princeton, in discussing the Theory of Energetics in its Philosophical Bearings spoke of the theory as 50 years old! Not to mention Aristotle's doctrine of enercy as "the first substance which must be immaterial" and as "that active exercise of the mind which constitutes life" (Metaphysics; Bk. xi: Ch. VI), we know that Swedenborg in 1740 taught a doctrine of Energetics in his theory of the Conatus in the Infinite Itself as the beginning of all motion and the internal principle of animation; Econ. Ragn. Animalis: 135, 281, and in the *Divine Love and Wisdom,* (1763), "That there is an Endeavor (Conatus) in earths to produce uses in forms or forms of uses." Nos. 310-312, and that "In everything spiritual there is an effort to clothe itself with a body," 343, and that "Love or the Will constantly tends towards the human form," 400, which are only fragmentary statements of Swedenborg's great doctrine of the Universe itself as the product of Love or of that primal Energy which creates through its own Wisdom a plane of work in ultimate effects, the phenomenal world of human experience.

Professor Joseph Jastrow, of Columbia, in describing the present status of our knowledge of the "Subconscious," laid emphasis on the

value of the study of dreams and especially of the "ordinary normal dream" without defining just what a "normal" dream would be. He defined the subconscious as that activity which continues beneath or apart from conscious life as in our memory, in sleep, etc. It is connected with the sub-voluntary activities of the mind and body. Swedenborg treats of this distinction in his doctrine of the respective functions of the cerebrum and the cerebellum. See *Divine Love and Wisdom,* 384, and as to what becomes of endeavor and power in man during sleep, 219.

Mr. Spalding, of the College of the City of New York, endeavored by an analogy in physical science of the origin and disappearance of energy, to disprove the dogma *Ex nihilo nihil fit* as applied to consciousness, and to prove that, to the contrary, consciousness does arise from nothing and ends in nothing. Professor Bawden, of Vassar College, contended, in arguing for the Functional Theory of Psycho-Physical Parallelism, that we must alter our ideas of matter; that Function means brains, plus thought, in experience. The conclusion seemed to be that experience is the only reality, and it does not much matter whether we describe it in terms of matter or of mind.

Professor Baldwin, of Northwestern University, gave an amusing critique of some of the bold ventures of the younger philosophers of Oxford. Dr. F. C. French in criticising Hoffding's theory of Religion treated of the new psychological concept of "value" (Swedenborg's "use") defining it not so much as a thing in itself as a ratio, a relation of things to their end.

Professor Ormond, of Princeton University, President of the Association, in his Annual Address on "Philosophy and its Correlations," remarked upon the fact that many themes of pure philosophy or metaphysics were being seized upon by science, more especially by the physico-psychological investigators, and taken out of their rightful realm of spiritual or idealistic thought and treated only empirically or from the material side. He pleaded for the freedom and autonomy of pure thought and the preservation of a rightful distinction between the realms and the respective methods of science and philosophy.

At a joint meeting and Banquet of the Affiliated Societies with the American Naturalist Society, Professor Cattell, of Columbia University, presided and in his Annual Address presented what may be described as a burlesque of psychological statistics.

At another session Dr. Ladd, of Yale, read a strongly affirmative paper on the Argument of the Being of God, which was followed by a general discussion on What should be our Attitude as Teachers of Philosophy towards Religion? in which Drs. Royce and Miller, of Harvard; President Frances L. Patten, of Princeton, and U. S. Commissioner Harris took part. All were affirmative in this "attitude," but there was a difference in the conceptions of Religion as brought into the discussion by the different speakers. Professor Royce seemed to

hold that the precious assurances of religion were in substance attainable without the necessary intervention of the "visible church" and that the philosopher could dispense with its aids and even be freer in the exercise of his use in the world without definite Church affiliation, although to the "church invisible" he would always remain a loyal adherent. What the "church invisible" is without any plane of ultimate and definite activity in the mental and social world was not clearly defined, still less the psychological difference between such mental states as adoration, worship, dependence, etc., as conceived, and the same as ultimated in acts of thanksgiving, sacrifice and prayer. Dr. Dickenson Miller, of Harvard, foreseeing that rational thought would have to give up its belief in revealed religion with its miraculous and supernatural attendants and content itself with the worship of nature and the human ideal, thought that the attitude of philosophy toward religion as so conceived might and ought to be amicable; whereupon Dr. Patten, of the Princeton Theological Seminary, remarked that to religion reduced to these modest dimensions it did not seem to him to matter very much what attitude philosophy assumed toward it. Dr. Harris in conclusion, from an eminently spiritual standpoint, argued for the doctrine of the alone spiritual origin of "cause," and remarked that while the idealistic philosophy as distinguished from materialism could not indeed give us bread and butter, it could give us, or strengthen our belief already possessed, in God, human Freedom and Immortality, and that these would never lose their supreme place in the values of humanity and civilization. FRANK SEWALL.

Washington, D. C.

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" . . . We have at last discovered, and even isolated, what we may call the 'electric substance.' We can weigh it, and measure it, and produce it in any quantity. It may yet prove to be the 'protile' of the philosophers—the fundamental and primordial substance of the universe. Whether it is that or not, we have now some definite and almost tangible nucleus round which to crystallize our thoughts. The 'electric charge' is now no longer a mere phantasm of the mathematician. It is a solid reality; as solid, at least, as a deal table. It remains . . . to remodel our text-books in accordance with the new truths and to build up our whole electrical science upon the properties of the substance whose conquest has been so long and arduous a task."—Writer in the *Electrician* (London).

# THE NEW PHILOSOPHY.

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## SWEDENBORG'S SUMMARY OF THE PRINCIPIA.

(CONTINUED.)

### CHAPTER V; CONCERNING THE ACTIVE OF THE FIRST FINITE, THAT IT CONSTITUTES THE SUN, BESIDES FORMING THE FIRST ELEMENTARY PARTICLES.

1. This active of the first substantial is only the motion of one substantial running into circles by means of which a surface is formed. 2. The axillary, progressive, and local motion in a simple or point cannot be examined in any other way than as an unknown quantity in algebraic analysis, by means of what is known, and consequently by means of things which are posterior and geometrical; and from the axillary, progressive, and local motion, as given in the sequents, it may be concluded that there was a something similar in their first origin; and that the very quality of the motions in the points may be disclosed by a similar analysis. 3. If in the first substantial the points arranged themselves into a spiral position, it follows from a mechanical necessity that such a substantial would revolve or rotate with an axillary motion. 4. From a mechanical necessity it also follows that such a substantial is progressively moved according to the position or order of the spires; that is, there is in it a motion of the parts or a progressive motion. 5. The centre of gravity is not in the middle of the substantial, but near its middle, and it follows the progressive motion of the parts and of the figure. The centre of gravity is in the plane of the ecliptic, not in the plane of the equator; and its progressive motion is *secundum consequentia,* or according to the ecliptic of the figure. 6. By

means of its axillary motion there is an effort (*nisus*) of the whole compound of entering into a second or local motion, and consequently this second or local motion is according to the motion of the centre of gravity. Since the centre of gravity not only revolves about its axis together with the compound, but also progresses in its plane or according to the ecliptic, the local motion describes not only a circle, but also a surface. 7. These actives flow with the same velocity, neither less nor greater, and they always form similar gyres and circles, nor can they form less or greater ones. 8. In this active there is no substantial except only that which is circumfluent and nevertheless a surface may be represented by motion, just as if it consisted of nothing but substantials. 9. There is no point in the surface of the active which can truly be called substantial beside the one where the fluent substantial is itself present. 10. Nevertheless, it is a most active [entity] and endowed with much force of acting upon the neighboring [entities]. 11. Nowhere in this surface can a point be conceived which is not acting, [although at distinct] moments. 12. In respect to this active finites bound in a series or in an aggregate, are passive. 13. This surface may, according to the different degrees of velocity, be represented as more and more like a continuous and finite surface. 14. This surface has no real dimension, but it may be called an apparent, imaginary, and mere surface. 15. When present, it acts perpetually upon every finite, and by its presence it can act upon the finites and dispose them into a certain motion, position and figure. 16. Several actives of this kind may flow within one and the same space without any running together or conflict. No running together can take place, as that one shall run up against the other which precedes it, because the velocity of all is equal and the circumference described by all is equally distant from any given centre. 17. Several may simultaneously adapt themselves to any angle and space, and, taken together, they may represent any figure. One circumference may apparently as it were cross and cut another; near one surface there may appear innumerable others, crossing as it were through that one. 18. Several in one space can rarely be in contact with each other, unless the abundance be too great. 19. And if they

run into each other they still continue the same superficial gyre. 20. Innumerable actives may occupy a very large space; they may occupy a space as large as the solar, and much larger. 21. They may also flow within an extremely small space within a surface consisting of finites. 22. A great number together in one space have a greater force of acting than a smaller number. 23. This active arises from the same force and cause from which arose its coeval or coexisting finite. 24. The apparent surface of the active is similar to the surface of its coexisting finite. 25. The running forth of the active into circles contributes no more to its activity than that it enables it to be everywhere present and to act everywhere; but that it is able to exercise a force upon the bodies it meets arises solely from its velocity and mass. 26. It could exist before its finite and be the cause of the contingent that second finites arose. 27. Therefore also the substantial itself, continually running forth into spiral circles according to its centre of gravity, can run forth no further than to a certain distance from a given centre, or always describe the same equal circumference and surface. 28. That force is attained by the velocity acquired is evident from the laws of motion. 29. Here again, being destitute of experience, we have formed principles, for in such very small and attenuated things experience does not present itself to our senses. But that a body may by internal motion be made to pass into another motion experience presents to our eyes every moment. 30. There is need that instead of a coronis a few words be said so as to show the connection of this [active] with the preceding [finite].

*The active of the point.* [From analogy and similitude with the active of the substantial we may in some measure conceive what is the active of the point, namely], that it is a point put (*actum*) into motion by its own internal force, and indeed into concentric spiral circles, by means of which a most exact surface is formed.

## Chapter VI; Concerning the first and most universal element of the world; that it contributes vortices.

1. In the world we [now] have two kinds of particles, the one most active, the other altogether passive; thus the one is

plainly contrary and inimical to the other. But before anything elementary can exist, it is necessary that there should be two principles in the world, the one active and the other passive. They cannot possibly be conceived as being so separated, but that they must unite into one body. Since therefore the one does not cease to act and the other to be acted upon, before each comes into the position suited to its action and passion, it may be asked what this position or figure of position may be. Wherever therefore there exists a small volume of this kind, consisting of actives and passives, there cannot but arise a position which is suited to each, in which position and space each may subsist according to its own force and disposition. By means of this new figure there is thus a connection of each with the first substantial from which they derived their origin. 2. It is defined that the elementary particle is composed of the second finites and the actives of the first finite, having a most yielding and elastic surface. 3. This elementary particle is composed of the second finites and the actives of the first finite. There is thus a boundary of space, not resulting from the actives, which terminate nothing, but from the volume of the finites which surround them. 4. The second finites constitute the surface, and the active of the first finite occupy the internal space. 5. The surface of this elementary particle is suspended and balanced in the midst of two forces. Such a product cannot be obtained by the analogies of the antecedent motions except by means of space, extense, position and figure; all of which are present if equilibrium be obtained. A surface may be said to be expanded by the actives included in it; a surface, also, when in the midst of two forces, is in its natural position. 6. The surface is most yielding and elastic. We therefore finally arrive at this conclusion, that there can be no yieldance in any surface unless there be something within which is not contiguous, but which nevertheless acts and presses as if it were contiguous. Since therefore the actives do not resist as if they were something contiguous, but act and push in every manner [it follows that an extraneous pressure would disturb the equilibrium]. Nothing can be more elastic than the surface of this elementary particle. Its resilience (*elater*) is equal to the pressing

force, or it recoils and reacts with the same force with which it is pressed. The sum of the forces before and after conflict is the same, or in every conflict or pressure the quantity of the forces is preserved. The surface when liberated from the compressing force is immediately restored. 7. The ratio of weight (*ratio ponderis*) in the surface is imperceptible so that it cannot be said to lose any on account of its ratio (*propter ejus rationem*); and in this expanded particle only a very small or no weight can be conceived of. 8. Nothing can be conceived either without or within the surface of this particle as resisting, but only as acting. 9. The finites, which constitute the surface, are connected together by a contiguous series. 10. The force and effort of all the finites in the surface are always the same and perfectly equal. 11. The motion and conversion of one finite in the surface of an elementary particle, is the motion and conversion of another and of all. 12. The change of state in one finite causes a change of state in another, throughout the whole surface of the elementary particle. The change of state in each individual or finite of the surface, proceeds from an external cause and from compression by means of contiguity. 13. Since these finites are in connection and constitute the surface, they cannot become actives, but they generally (*fere*) remain passive and inert. 14. If the finites of the surface should drop out of their series, or the bond which associates them be loosened, they could not become actives and go into local motion, but would immediately pass into some series of a neighboring surface and betake themselves to other finites of the same kind. 15. But nevertheless from one elementary particle many actives may exist, which, together with the enclosed actives, may occupy a larger space. 16. A small volume of finites may present a large volume of elementary particles. 17. This elementary particle, consisting of finites and actives, may be compressed into one still smaller and smaller, and again, it may be expanded from a smaller into a larger. 18. In every degree of compression the similarity of the surface is most exactly preserved, although the surface may be larger or smaller. 19. The series of finites flowing through the surface may flow in a simple, double, or triple order, according to the degree of compression

with the adjacent [particles]. 20. In a state of compression [this elementary particle] begins to form certain polar cones towards the centre. 21. In the greatest degree of compression the elementary particle changes into some new finite. 22. And thus it ceases to be elementary. 23. The enclosed actives have a greater force of acting and reacting upon a compressed than upon a dilated particle. 24. Under too great a compression the enclosed actives begin to lose their force. 25. In the greatest degree of compression the actives evidently disappear and attach themselves to the finites which occupy the surface, and plainly cease to be actives. 26. The elementary particles cannot perish by any degree of compression, but they ultimately change into some new finite. 27. In their greatest degree of expansion they may perish and be dissolved. 28. They may be dissolved by actives acting upon them from without. 29. These finites may become actives. 30. When dissolved, they may pass into the surfaces of others which are similar and there continue their motion. 31. In this elementary there may be all degrees or kinds of elasticity, but according to the degree of compression. They possess a greater degree of elasticity when expanded and a lesser when compressed. In the greatest expansion their surface is most yielding, and finally in the greatest degree of compression it becomes hard and non-elastic, and at the same time it ceases to be elementary. 32. One elementary particle touches and presses upon another, and by means of this contact forms a contiguity of one particle with another. 33. Which could not take place unless it were in agreement with their motion and figure. 34. And except in a parallel position so that the poles of all are in a parallel position or line, likewise the remainder of their circles greater and lesser; and they are kept in this parallelism by the mechanism of their figures and their contact at the poles. 35. Nevertheless they may be easily disturbed in their position, but they immediately return to it as their natural one. 36. Several of them, or a volume, when put into motion, cannot be circumfluent otherwise than according to that parallelism or the position of each. In the motion of the volume there are likewise axes, which are the axes of its motion. 37. From the motion of the volume of these particles

exists their vortical motion, and no other particles can be better adapted to a vortical motion than these, on account of their figure and elasticity. 38. From the least force they flow into a vortical motion. 39. There can be no other vortical motion among the particles than such as is accordant with the figure of each particle and always refers itself to some axis of motion or gyration. The vortical motion likewise forms a certain polar axis. The circles of vortical motion among these elementary particles which are more remote from the centre of motion become more and more oblique and bend themselves until they come into a right line with the axis; until the motion terminates in a straight line and thus it evidently vanishes according to the parallelism of the axes of the particles. A vortical motion arises from a motive force in a given centre; and when thus begun from a centre the greatest motion is near the centre and the least at the outermost circumferences. The polar axes of the particles are the same as the polar axis of the zodiac, and their equators the same as the zodiac of the solar vortex. 40. Superficial matter, or finites, flowing through a surface, may, near the poles, pass into the surface of the neighboring particle. 41. By this translation of the finites and superficial matter from one surface to another, the surfaces of the particles may be diminished as well as enlarged; that is, they may be made smaller or larger and may thus be brought into an equilibrium of space and weight with their neighboring and associate particles. 42. The enclosed actives follow their enclosed particle (*quod ipsa activa inclusa sequantur suam particulam inclusam*), as if in their own natural location, and they are not sensible of the local motion of their particle; likewise neither the finites, which occupy the surface, if there be a local motion of the volume. 43. The cause of their compression arises from the action of one upon the other by means of a motion proceeding from a large space of actives. 44. Their compression may also arise from their mutual incumbency. 45. There is in the volume the same elasticity and ratio of elasticity which there is in the single particles. 46. They press according to the altitude in their vortex. 47. They also press according to the base or area subtending the altitude. 48. They press equally upward

and downward according to the altitude. 49. They do not press so obliquely as the aereal particles. Their altitude is only according to the plane of the equator of each particle, or according to the plane of the zodaic of the solar vortex. 50. This element is the most subtle, the first and most universal. All spaces, as well the greatest as the least, in every solar system (*in quocunque mundo*), are occupied by this element; it is likewise of all others the most contiguous. By means of it all things in the starry system appear as it were present. And if they do not appear it is only because we are accustomed to measure distances by comparing the angles of such things as are present together before the eye. By the help of this [element] we may contemplate the remotest stars, as also the planets by their reflected light. 51. In this elementary particle is latent all that had pre-existed, such as the point, the first finite, the second finite and the active of the first finite.

*Concerning the figure of the above-mentioned entities.* 1. The individual [parts] in a finite or compound are similar to each other, as well in regard to figure and position as in regard to motion; and the individual [parts] of these are likewise [similar], even to the point, in which lies the primitive force and the first cause of finiting the sequents. 2. The spires near the centre have a greater curvature (*acutiores*), and those more remote from the centre a less (*obtusiores*), as well in the polar cones as in the surfaces; and in the polar cones the kind of spires are different from those in the surfaces, whether nearer or more remote from the centre. 3. A small cavity is left in the middle, which on one side extends farther from the centre than on the other; and the plane of the ecliptic bisects all the superficial spires midway from their centre (*in media distantia*). 4. The centre of gravity is situated without the middle and in the plane of the ecliptic. 6. There is an axillary motion of the whole corpuscle, greatest when [the corpuscle] is in a very free state, less in a state of compression, and finally none in the greatest compression. There is a progressive motion of the parts *in consequentia* or according to the ecliptic, and the progressive motion is greatest in a very free state, and least or none in a state of compression. From an axillary arises a local motion, and this local motion is deter-

mined by the centre of gravity and directed by the progressive motion into the figure of a surface. 7. The local motion by which the surface is described is spiral, and in this apparent surface there are poles and the circles are larger and lesser as in finites and thus in regard to figure finites and actives are similar to each other. 8. The elementary particles in regard to their figure are also similar to finites and actives. In elementary particles the centre of gravity is in the surface, especially in a state of compression, when the surface is as it were convoluted into several folds. Consequently there is an axillary motion in every particle; there is also a progressive motion; or a force or endeavor towards a local motion. The axillary, progressive, and local motion of the elementary particle is the same in its state of expansion as in its state of compression. The elementary partiiles in a state of expansion make an effort to go (*nitantur*) into a larger circle; in a state of compression into a smaller. By the least action in their volume, or even spontaneously, the elementary particles wish to flow into a circle. They are thus most prone and apt [to go] into a vortical motion, which they perpetually continue in the same way. The finites constituting the surface of the elementary particle cannot be connected and conjoined in any other way than around the poles, and indeed in a position perfectly similar as to the centre of gravity of each. 9. The reason of the position as well as the motion of the parts and compounds is a mechanical, geometrical and physical necessity.

### Chapter VII; Concerning the actives of the second and third finite.

1. The primitive force in the point, such as it has been treated of, cannot be otherwise than derivative, and cannot but raise itself higher and higher when the occasion is presented, and by its multiplication present [entities] similar to itself. 2. All the finites which arise from the point have a similar force of finiting as well as of actuating themselves. 3. The active of the second finite is the same as the second finite set at liberty. The second finite becomes active if there be no contact, and the internal force of the second finite becomes motory and passes into act if there be no pressure. 4. The active of the

second finite consists of individuals which are the first substantials. 5. The active of the second finite may come into existence from the same causes as the active of the first finite. 6. And it possesses the same qualities as the active of the first finite. 7. There is this difference, that the active of the second finite describes larger circles than the active of the first finite and that the active of the second finite does not flow with such velocity in its circumferences as the active of the first finite. 8. The active of the second finite can be in the same space with the active of the first finite, if the space be not too confined; but the actives of the second and third finites may more easily meet and run into each other than the actives of [only] one kind. 9. As regards mass the active of the second finite is stronger than the active of the first, but as regards velocity it is weaker. Still, nevertheless, the active of the second finite possesses a stronger impetus than the active of the first finite. 10. Actives of the same kind always flow with the same velocity, and they cannot flow with a less or a greater. Thus between actives of one kind there are no degrees of velocity, but there are [degrees of velocity] between two kinds of actives. 11. Actives of one kind always describe the same circles and gyres, and cannot describe greater or smaller ones [than these]. 12. These actives do not form their circles or surfaces round one centre, but around various centres; that is, the derived actives run out into surfaces or circles eccentric and not concentric. 13. By means of this eccentricity the apparent surface of the active appears to describe a new and different surface and one which is its own. By the progression of their centre actives are transferred into every imaginable point of their space. 14. Actives cannot be said to form anything contiguous or to occupy any determinate place. 15. Actives are devoid of all determinate place and position unless they are enclosed by finites or elementaries. They have nowhere in their space an upward or a downward. There is no weight in an active space; the greatest active space has the same weight as the least. 16. Actives cannot be said to resist, but only to act. 17. A number of actives does not constitute an element or matter, nor are the actives themselves to be considered as elementary particles. 18. The force of the active space is increased

and becomes stronger according to the number of actives. 19. A space which is filled with actives of the first and second finite acts more strongly if filled with actives of but one kind. 20. The Solar Ocean appears to consist of actives of the first and second finites.

*Concerning the actives of the third finite.* The primitive force in a point continually produces [entities] similar to itself, by the multiplication of itself into itself, whenever occasion offers; and the force can go out into act. 2. The active of the third finite is the same as the third finite set at liberty. 3. The third finite is rendered active if there be no contact with similar finites. 4. The velocity of the active of the third finite is less than the velocity of the active of the second finite, and still less than the velocity of the active of the first finite. Likewise, the circles and surfaces which the active of the third finite describes are larger than the circles or surfaces of the active of the first finite. The mass in the substantial of the active of the third finite is greater than the mass of the substantial of the active of the second finite. 5. The active of the third finite acts both by its mass and velocity and it is stronger in acting than the active of the second finite. 6. The actives of the third and second finites may be together in one space. 7. The actives of the third and first finite cannot be together in one space, since, in consequence of the difference between their velocities, circles and dimensions, the circles and fluxions of the active of the first finite would be utterly disturbed, and they would either be expelled thence or the active would evidently be absorbed. 8. By means of the influx of actives of the first finite the actives of the third finite may ultimately lose their active force. 9. There are in the world no actives of the third finite, but they are all third finites and compose the surface of the second elementary particles.

## CHARACTERISTIC AND MATHEMATICAL PHILOSOPHY OF UNIVERSALS.*

1. In order to have an intelligible philosophy of universals, it is necessary to make use of characters and signs, which must signify the things treated of, or the materials of the things; for, as has been said formerly, when things obvious to the senses, or objects, are raised to higher degrees from a sphere of vulgar words to one of common words, they re-establish themselves; wherefore, unless we signify superior correspondences by letters or characters, we cannot at all describe them; for it is not permitted to introduce new words, for this would require us to write a dictionary of new words, a thousand of which would not be sufficient to represent the things which occur in the superior degrees. Therefore, the characteristic philosophy is first to be elucidated before it is permitted to proceed to the mathematical; but as the meaning of things may be rendered obscure by signs, let us make use of letters, raised through their several degrees, each letter expressive of some particular thing, as blood (*sanguis*) by S, artery by A, muscle by M, nerve by N, and so with the rest. But let us illustrate this by examples:

2. S signifies blood of an exalted degree (*sanguis eminens*), or the spirituous fluid.

SS blood of an inferior degree, or the middle or purer blood.

SSS the red blood, because it is of the third degree of composition, or of the third degree from the first or spirituous fluid.

SSSS is the blood clot, or crassamentum, a little mass (*molecula*), whence is the sanguineous fibre.

A is the *arteria eminens*, or the simple nervous fibre.

AA the arterial vessels of the middle or purer blood.

AAA is properly called artery, which corresponds to the nervous fibre in the third degree.

*From the photolithographed MSS. of Swedenborg, Vol. VI. Now first rendered into English.—C. L. Olds, translator.

AAAA is the great arterial canal, around which the arteries of the third degree are twined in an annular form, as occurs everywhere in the animal body.

M signifies muscle of an exalted degree, or of the first degree; this is the motor fibre determined by the simple nervous fibre.

MM the motor fibre composed of middle or white blood vessels.

MMM the fleshy motor fibre, or that woven together by the vessels of the red blood.

MMMM denotes the muscle itself, which is a motor fibre of the fourth degree.

N is also the simple nerve fibre.

NN is a fascicle of simple nerves.

NNN is the nerve itself composed of fascicles.

NNNN is a nerve ganglion, or a great trunk composed of many nerves, as the great sciatic, brachial, etc.

So in all the remaining; I only wish to adduce this here by way of illustration.

3. From these things it may appear that N and A, or the simple nerve fibre and the artery of exalted degree, are one and the same in eminence; but from the mode of determination another series is born; the simple nerve fibres grouped together, and the group surrounded by a tunic, constitute a fascicle, and the simple fascicles grouped together and covered with a tunic form the nerve. But the same fibre circumducted about some hollow in the form of rings, and so prescribing limits, forms the blood vessels, etc. Likewise the same fibre in a right line, obliquely placed or otherwise flexed or twisted, constitutes the motor fibre, and these latter gathered together and covered by a tunic constitute the white (*candidus*) motor fibre, etc., whence is the muscle; consequently, from the mode of determination flows the correspondence of inferiors; thus from one single universal innumerable species of particulars arise.

4. In order that there may be a substance which may subsist *per se,* it is necessary to add another which differs from it, that it may copulate, terminate, and thus separate; as the

spirituous fluid, unless the most minute saline elements derived from the ether had been added, the purer blood could not have been produced at all, and unless the elements from the air were added to this it would not be changed into the red blood. Then, also, unless the nerve fibres gathered together were surrounded by a proper tunic, they would not pass into a fascicle; and unless the fasciculi were enveloped by their tunic, they would not be formed into a nerve. It is fitting to call those substances which are now added accessories, in order that a substance may manifest itself in its own degree. The accessories are to be denoted by the letter *a*. Thus:

S*a* is the purer or middle blood, for S. signifies the purest blood or spirituous fluid, which when adjoined to *a*, or the etherial saline elements, becomes the purer blood.

S*aa* is the red blood, for *aa* signify of the second degree, or the aerial saline elements.

S*aaa* is blood clot, for *aaa* signify saline elements in the third degree of composition.

N*a* is the nerve fascicle, for N signifies the simple fibre; but *a* the tunic which invests many fibres and joins them into a fascicle; whence the fascicle exists as a substance *per se*, and when so connected, is terminated and separated from its prior as well as from its allied parts.

N*aa* is the entire nerve; for *aa* is the tunic which, investing the fascicles, binds them into one body, and separates them from their superior and allied parts.

N*aaa* is the complex of nerves within their own proper capsule or sheath, as the great sciatic nerve, etc.

So also with the remaining; for in order that the essence and nature of something of an inferior degree may be known, it is necessary that it be known what accessories there are which connect, terminate and separate it, likewise their number and quality. So also in the muscle, unless the motor fibre of one degree be separated from that of another degree by a tunic, it is not a motor fibre *per se*.

5. *Connection* also is required in order that the substance, whatever it may be, may produce the effect together with its

allied parts; and indeed a connection not only between the allied parts, but likewise between the parts of inferior and superior degrees; for without connection the cause is not active, for some effect thence flows into the ultimates of the series.

But connection is two-fold; that is to say, there is a *continuous connection* and a *contiguous connection.* Let the continuous connection be signified by *nc* and the contiguous connection by *nf.*

The continuous connection is between cohering substances, whence it is signified by *nc;* and the contiguous connection is between fluent (*fluens*) substances, whence it is signified by *nf.*

*nc* or continuous connection, as in fibres, muscles, membranes, becomes by intercedence threads or membranules, so that the substance is perpetually connected with an allied substance or one of the same degree; there is also a connection by threads and membranes with the involucra which separate them from the superior and inferior degree, which is a connection in ascending and descending order; then also by the very vessels themselves, which likewise separate themselves when they are continued.

*nf* or contiguous connection takes place through contact, as in fluids, water, oils, blood, air, etc. The more perfect this connection or contiguity is, the more the parts rejoice in a form more perfect, more circular, and are themselves endowed with a greater power of reacting, and are more elastic; they likewise rejoice in more perfect fluids within, and better ones around about them or in the interstices. Thus in order that we may get a correct knowledge of these contiguous substances, we ought to know their form and construction; also, their dependence upon the other parts, which are from these diversely, and yet touch them.

Accidental and qualitative connection is as it were contiguous, for it flows from substances in accordance with their connection; and may be compared with fluids which from the action of their substances are excited into a motion either undulatory or modificatory.

6. *Quantity* is of two kinds, viz., that of magnitude and that of multitude; the former is called continuous quantity, but the

latter discrete quantity; the former is to be signified by *Qc*, and the latter by *Qd*.

*Qc* or continuous quantity is that which exists between allied parts or those of the same degree, as when a vessel of the red blood increases in magnitude; or a vessel of the purer blood, or a fibre of the spirituous fluid, or some motor fibre becomes larger, etc.

*Qd* or discrete quantity exists when a blood vessel increases in number, branching into many vessels, as an artery into arterioles; and so with all the rest.

Thus we ought to adjoin those whose quantity we desire to signify, as S*Qc* or continuous quantity of the blood; S*Qd* or discrete quantity of the blood. Hence, N*Qc*, M*Qc*, A*Qc*; or N*Qd*, M*Qd*, A*Qd*, etc.

7. But because every quantity comprehends its own minimum and maximum, hence its minimum or unity ought to be signified by 1, its major or intermediate by 2, and its maximum by 3. Hence, *Qc*1, *Qc*2, *Qc*3; or *Qd*1, *Qd*2, *Qd*3. *Thus* N*Qc*1 is the simple fibril of a nerve; N*Qc*2 is a larger congregation of fibrils, whence is the fascicle; and N*Qc*3 is the largest fibril composed of the same fascicles. Thus it is that the fascicle is never so enlarged by the number of the fibres that it becomes a nerve, but that it becomes a major or maximum fascicle; only the tunic which surrounds it is added. Thus, NN*Qc*1, NN*Qc*2, NN*Qc*3. So likewise, NNN*Qc*1, NNN*Qc*2, NNN*Qc*3.

A*Qc*1 is the nerve fibrule of the same degree as the *arteria eminens;* AAA*Qc*1 is the simple red blood vessel; AAA*Qc*2 the major, and AAA*Qc*3 the maximum, or the great artery or powerful heart.

8. Rules to be observed in the explanation of things:

(a) To what series does it belong?
(*b*) In the series of what?
(c) How it ascends by degrees.
(d) What degree it is.
(e) What it is and what enters into it.
(f) Its maximum and minimum.

## IN MEMORIAM.

In the departure from this life, in February last, of Mr. Carl Hj. Asplundh, the late Treasurer and Publishing Manager of the Swedenborg Scientific Association, which event occurred at Bryn Athyn as a result of an attack of pneumonia, the Association and its quarterly bulletin suffers a very great loss. His ability as a business manager was equalled by his conscientious fidelity to all the higher interests in his charge, his wide documentary knowledge and his sincere love for the Church and its sacred mission to the world. His careful attention to the financial interests of the Association should prove an incentive through his memory to every member and to every reader of our publications to be faithful in the individual duties belonging to each one.

## THE SWEDENBORG SCIENTIFIC ASSOCIATION.

### ANNUAL MEETING.

The Sixth Annual Meeting of the Swedenborg Scientific Association will be held at the Parish House of the Kenwood Church of the New Jerusalem on 46th St., near Woodlawn Ave., Chicago, Ill., on Wednesday and Thursday, July 1 and 2, 1903. The opening session will be held on Wednesday at 2 P. M. The President's Address will be delivered at 3 P. M. of the same day. All who propose to attend the meeting or to contribute papers are invited to notify the Secretary not later than June 17th.

By order of the President,

E. J. E. SCHRECK,
Secretary.

159 East 46th Street, Chicago, Ill.

**New Treasurer of the Association:**—It was proposed in the Board of Directors to fill the vacancy in the office of Treasurer created by the passing away of Mr. Asplundh, and correspondence among the members of the board resulted in the decision announced in the following communication by the President of the Association:

"The Rev. E. J. E. Schreck, Secretary of the Swedenborg Scientific Association:

"Whereas, The following members of the Board of Directors have cast their votes for Charles E. Dœring for Treasurer of the Association, for the remainder of the present term, viz.: Messrs. Mercer, Whitehead, Farrington, Acton, Schreck, Gladish, Hite and Swanton, as witnessed by the enclosed signatures, I therefore declare that Charles E. Dœring is elected Treasurer of the Association until the next annual election of officers.

"FRANK SEWALL,
"President, and Chairman of the Board of Directors."

We regret that his many other duties have prevented the translator of Swedenborg's work on *The Senses* from furnishing an installment for this number.

**European Interest in Swedenborg's Scientific Writings:**—The following letters will interest those who have followed the movement for publishing Swedenborg's Scientific MSS. now on foot in Sweden. The second was received through the President of the Association.

Editor of *The New Philosophy:*

In the January number of *The New Philosophy,* page 25, I notice that there is an account of the recent action of the Swedish Royal

Academy of Sciences. The following historical sketch may be of interest to the readers of *The New Philosophy* in connection with the development of interest in Swedenborg's scientific works in past and present times.

As long ago as 1845 Professor Anders Retzius, the great anatomist and founder of modern anthropology, wrote most appreciatively of Swedenborg's scientific genius and compared him to Aristotle. His son, Professor Gustaf Retzius, among others, supplied the historian Fryxell with statements respecting Swedenborg. Then came Dr. R. L. Tafel's great work in calling attention to Swedenborg's valuable contributions respecting the brain and nervous system, by a publication of a translation of some of the manuscripts, together with masterly comparisons of Swedenborg's results with those of modern scientists, showing that very important anticipations regarding function and structure had been made by Swedenborg. In 1883 Professor C. Loven described the first volume of Dr. Tafel's edition of the *Brain* at a meeting of the Academy of Sciences. After this, among other European notices of Swedenborg's scientific works, may be mentioned a long contribution to the Proceedings of the Academy of Sciences for 1889 on *Swedenborg as a Mathematician,* by Gustaf Enestrom. In 1892 the geologist A. G. Nathorst in his work on the *Geology of Sweden* called attention to the notable work Swedenborg did in the field of geology. In 1900 meteorologist N. Ekholm referred most favorably to Swedenborg's *Principia,* particularly to the comparison of the forces obtaining in the primeval "chaos" to those of the magnet. Within the last few months a great text-book on cosmology and physics has been published by Dr. Svante Arrhenius, in which Swedenborg's position in the history of cosmogony is recognized. In recent times Dr. Max Neuburger, of Vienna, has again drawn the attention of scientists to Swedenborg's remarkable anticipations of later results in the physiology of the brain. In the early months of 1902 Dr. Neuburger, through the Swedish legation at Vienna, inspired a document of enquiry respecting the unpublished manuscripts of Swedenborg preserved in Stockholm. The document was received by Profesor Gustaf Retzius and the manuscripts examined. However, the handwriting was found to be very difficult and nothing further was done. Sometime after my arrival in Sweden I met Profesor Retzius and he asked me to help in an investigation of the manuscripts. Interest in Swedenborg's scientific works increased and the idea came to Profesor Retzius that a committee of investigation be appointed and on December 11th he laid a motion to that effect before a meeting of the Academy of Sciences. The motion was passed and the committee appointed. I had the great pleasure of being present on this memorable occasion, so interesting to the student of Swedenborg's science and philosophy. Since the meting the committee has met and organized.

ALFRED H. STROH.

STOCKHOLM, March 12, 1903.

DEAR MR. STROH,

You have asked me, how I conceived the idea of proposing to the Swedish Academy of Sciences to appoint a committee for revising the manuscripts of Em. Swedenborg that are kept in the Library of the Academy.

I will with great pleasure tell you the history of this proposal.

Many years ago, in the beginning of the 1870-decade, the renowned Historian Professor Anders Fryxell, the Author of "Berattelser ur Svenska historien," asked my opinion about the value of the anatomical works of Em. Swedenborg. I then tried to study the edited anatomical works as far as they were to be had in the Library of the Caroline Institute (The Medical School of Stockholm), and as much as my time could afford. I wrote to Prof. Fryxell a short treatise on the subject. I had found that Swedenborg was a most learned man in the anatomical literature as well as in other branches. I had, however, then not found those marvellous passages where Swedenborg pronounces new ideas on the localization of the different centra in the brain, nor the exposition of the cerebro-spinal fluid, etc.

In the year 1882 the highly interesting work "The Brain considered anatomically," etc., edited by R. L. Tafel, was published. Dr. Christian Loven, at that time Profesor of Physiology at the Caroline Institute, referred Dr. Tafel's work before our Swedish Academy of Sciences and pointed out, that Dr. Tafel had shown that several of the later great discoveries in the science of the brain and the nervous system were either made or more or less foreseen by Swedenborg, for instance the localization of the psychic faculties in the cortex of the brain and especially the localization of the motor centra, which in our own time were again discovered by P. Broca and by G. Fritsch and Hitzig (in 1870), the existence, importance and distribution of the cerebro-spinal fluid in the brain, the spinal marrow and the peripheric nerves, which fluid, after Swedenborg's time, was described by Cotugno, Magendie, Bogros, A. Key and myself.

Since that period I did not have the opportunity to occupy myself with Swedenborg's works, until in last spring (1902), when I received from the Swedish Ministry of Foreign Affairs in Stockholm a request, which was based upon a paper from our Legation in Vienna. Docent Dr. M. Neuburger had asked the Legation to transmit a printed treatise by him at the meeting of the naturalists in Hamburg in 1901 "Swendenborg's Beziehungen zur Gehirnphysiologie."

The Swedish Ministry of Foreign Affairs remitted the papers of the Legation and of Dr. Neuburger to me. In the former paper the Legation mentions: "In the letter, by which Dr. Neuburger transmitted his paper, he writes amongst other the following:

"Da selbst in den gelehrten kreisen Deutschlands uber Swedenborg's wunderbare Vorahnung der neuesten Errungenschaften der Gehirn-

physiologie so gut wie nichts bekannt war,benutzte ich die Gelegnheit des Naturforschertags um Swedenborg als Vorlaufer Gall's und Hitzig's zu feieren. Es ist sehr zu bedaurn, dass eine in Stockholm liegende, umfangreiche Handschrift Swedenborg's uber das Gehirn noch nicht veroffentlicht worden ist."

In consequence of this remittance I tried, in the Library of the Academy of Sciences, to make studies in Swedenborg's manuscripts of anatomical contents. But I soon found, that it would take me more time than I could devote to this work. The manuscripts are voluminous and in many places very difficult to read. The Latin proved also often difficult to understand. I therefore soon found that I must give up this work.

In the autumn (last year) I heard that an American investigator of Swedenborg's works, Mr. Alfred Stroh, had arrived in Stockholm. It was then that I tried to make your acquaintance, Mr. Stroh. I soon met with you and found that you were able to read and to understand quite well the manuscripts of Swedenborg, and you were kind enough to promise to help me with the deciphering.

This was the reason why I again took up the problem.

I then proposed to the Academy of Sciences to name a committee of five of her members for examining the scientific manuscripts of Swedenborg, not only the anatomical, but all of them, the physical, the geological, the paleontological, the metallurgical, etc.

I told the Academy that Dr. Neuburger had asked through the Legation of Vienna for an examination of a manuscript concerning the Brain, but I thought it to be best to try to examine all the others, if there might be some inedited of a high value. I also informed the Academy that we at present had the good opportunity of having in our country Mr. Alfred Stroh, whom I had, with the permission of the Secretary, invited to the same session of the Academy. Thanks to you it might be possible for us to get the work executed.

The Academy then nominated a committee of five members, Professor Christian Loven, Professor Alfred Nathorst, Professor Svante Arrhenius, Professor S. E. Henschen and myself. We began our work, as you know, with the decision to divide the researches in accordance with our special sciences and by considering which of the manuscripts might be the most important for copying. As you kindly informed us, that in America there might exist copies of one or two of the most voluminous and most important manuscripts, we charged you to make inquiries about them, and we suspended the decision of the copying, until you could give us information on this question. We also ought to get means for the expenses necessary for the copying. There are happily persons here who can do that work, but it is necessary to get the transcriptions revised, and you have been so kind as to promise us to inspect and to revise them. We are therefore indebted to you, Mr. Stroh, for your great interest in this problem, which for the history of Science is of great importance.

This is the story of the beginning of our Swedenborg investigations. I have here given the dates just as they have succeeded each other. I take this occasion to thank you for your promise of helping us with the studying and deciphering of the manuscripts and the revision of the transcriptions.

Yours very sincerely,
GUSTAF RETZIUS,
*President of the Swedenborg Committee of the Academy of Sciences.*

**Lester F. Ward on the Doctrine of Discrete Degrees:**—Lester F. Ward, in his recent work entitled "Pure Sociology; A Treatise on the Origin and Spontaneous Development of Society," published by the Macmillan Company, makes an interesting comment on Swedenborg's Doctrine of Discrete Degress. In explaining an illustrated table of what he calls the "Synthetic Creations of Nature," showing the "causes" to be telic, conative, efficient; the "Phenomena" to be social, psychic, vital, physical; the "Activities," molar, molecular, radiant, etc., Mr. Ward says: "Although their primary elements always existed, the combinations resulting in the several products constitute so many distinct things. . . . Each new plane of existence thus attained is a fresh base of operations. The successive products and properties are so many discrete degrees in the history of the universe. Only his most philosophical disciples know just what Swedenborg meant by "discrete degrees," but as he was a true poet, this may have been a poetic or prophetic vision of the law of evolution and universal genesis which I have endeavored to sketch. He may have dimly seen the creative power of nature and the principle of creative synthesis and his discrete degrees may have been an adumbration of the synthetic creations of nature." p. 94.

In other words, Mr. Ward is telling us that Swedenborg wrote wiser than he knew, so much so as to have even adumbrated the system of evolution here brought to light by Mr. Ward himself. Gratifying as it is to see Swedenborg's doctrine of degrees recognized by a writer of Mr. Ward's ability and reputation it is nevertheless important to the interests of science that this doctrine even in its adumbrations be not mis-conceived or mis-stated. Accepting Mr. Ward's definition of the successive products in nature's creative series being "new planes of existence affording fresh bases of operation" as applying to the discrete degrees of Swedenborg, there is something more involved than this mere serial order in the latter and that is what constitutes the peculiar discreteness of Swedenborg's degrees; and that is, that they are at once simultaneous and successive, being simultaneous as one within the next and these within the third so that all are immanent in the last and lowest product, and yet, while all together in the last, they retain severally their original character without confusion or blending into one "continuous" degree. Thus according to Swedenborg "End" is in "Cause;" and End through Cause is in Effect, but while End and Cause

are both actualized in Effect they never cease to be distinctly End and Cause. Ontologically applied God as End is *in* Spirit as Cause, and both are *in* Nature as Effect; and yet God retains His eternal discreteness from both the spiritual and the natural worlds in which He is immanent as the universal pervading End or Final Cause. Thus only is Pantheism to be avoided. In Nature's series also the doctrine of discrete degrees as applied by Swedenborg means not one product following another merely in accumulative series, but as evolutions from prior involutions; or each new "basis" being not a new creation as now first conceived, but a new step in the evolution of the end immanent from the beginning.

Swedenborg's doctrine of "series, orders and degrees" is consistently applied with mathematical clearness and exactness all through the philosophical works, and requires no especially "philosophical disciple" to understand it; but in the theological period its application is of a much vaster scope, embracing the whole range of being, natural, spiritual and divine, and thus the discreteness acquires an altogether wider significance. F. S.

## REVIEWS.

**The Infinite and the Final Cause of Creation; also, The Intercourse between the Soul and the Body.** *Outlines of a Philosophical Argument. By Emanuel Swedenborg. London. The Swedenborg Society, 1 Bloomsbury street. 1902. New York, 3 West Twenty-ninth street. pp. 235.*

The original work was published in Latin by Swedenborg in 1734 at Dresden and Leipsic. The author's title is there given as "Assessor of the College of Mines of His Sacred Majesty of Sweden." The work followed the author's *Principia* and seems to anticipate the larger work on The Soul, *De Anima,* which was written as a concluding part of the *Regnum Animale* and posthumously published in 1849 in Latin, and 1886 in English. The work *On the Infinite* was translated by Dr. James John Garth Wilkinson, M. R. C. S., of London, and published, with the translator's introduction and notes, by the Swedenborg Society in London in 1847. Even so early as 1795 a translation had appeared in Manchester, being done by two scholars in the Classical School of the Rev. W. Cowherd, but this was held by Dr. Wilkinson to be so unsuccessful as to call for a new effort. Dr. Wilkinson himself had frequent difficulties with the author's meaning, as his notes testify, and in some instances he has ventured on corrections of the original where it was divergent from Heister, the anatomical authority extensively quoted by Swedenborg. The work having been long out of print, the Swedenborg Society, of London, has shown its liberality and excellent judgment in bringing out a new edition from large type and in convenient shape, and thus one of Swedenborg's earliest and profoundest metaphysical discussions is enabled to take its place by the side of similar

discussions of today, and to show wherein its author wrote what was of more than ephemeral interest and worth.

Swedenborg's quest is here as throughout his philosophical period that which lies beyond the finite, and the problem is how to reach this by methods coincident only with finite thinking. As he finds the infinite lying before all things as their necessary source and cause, so he finds at the end of his quest the soul still lying beyond his reach so far as it partakes of the infinite. Between these vast mysteries lies a perfectly mechanical and geometrical world. Whence can this perfect form, order and adaptation come, but from an end or purpose in a self-causing infinite; and how does this end find its access into the mechanism of an extended world except by some means of the infinite's own creating; and how does the end find its realization in that world except in lifting the soul into the realm of the eternal and into union with its infinite source again? All the ancient contradictions of the Greek Sophists, all the "antinomies" of Kant, the mysteries of number, of time, of space, motion and change are threshed out in the author's cool, determined search for an answer to the questions, Whether there be an Infinite, and if so What is it? and Is there a Nexus or Link between it and the finite? On *a priori* grounds he proves by rational argument that the Infinite exists, that the nexus also exists as a part or function of the Infinite, and that the finite, while characterizing all our thought and knowledge leads us to the belief in the Infinite and so in God, although He be beyond our knowledge and understanding. Swedenborg's scientific method is that of a graded mechanism, i. e., a mechanism of increasing perfection as it applies itself to the finer subjects so that it may soar above gross matter into the ethereal, invisible, even into the spiritual, nay into the free activity of the Infinite itself and still be mechanical, that is a procedure of forces by determined law. Determinism and free will are reconciled in an interesting experiment of bringing together the timeless infinite purpose, which knows no future, with the reflection of the same in time's succession and in the corresponding modes of finite thought, giving before the finite mind the form and appearance of pre-determination to that which in the Infinite is only ever present free will completely seeing and completely accomplishing its ends.

The book is so rich in thought as to baffle any attempt to represent it by fragmentary extracts. The beginning is quite Socratic in the author's seeming acquiescence in the ordinary reader's conclusion that no infinite can exist and therefore no God beyond the material and extended; but only, like Socrates, to show into what a dilemma this brings us. He then points to the way out by means of a cause-world in a sphere utterly discrete from extension and hence neither great nor small, neither of short nor long time, but rather infinite and eternal or timeless. The beautiful simplicity of the author's language, as well as the humility of his philosophic spirit, will attract the reader and win his confidence. "You see here," he says in opening, "philosophy rea-

soning upon the infinite and the soul, yet using the most familiar words and a humble style and endeavoring to divest herself of the net of metaphysical terminology." The reason is defined to be "a faculty partaking both of the soul and the body, whose end is to enable the soul to be instructed through the body and its organs, that afterwards it may dispose all things in such order and connection that a rational principle may be the result. The end for which reason is given us is that we may be empowered to perceive that there is a God and to know that He is to be worshiped. If reason be the means endowed with the faculty and power of perceiving, and if the actual perception be the end, then the means in so far as it is correctly rational cannot be repugnant to the end." (The author's preface.)

That is, we must dismiss all fear of the reason as liable to lead us into disbelief when its whole nature lies in the current of true belief. "The very mysteries that are above reason cannot be contrary to reason, although reason may be unable to explain these grounds." (p. 6.) The philosophizing mind is ever enquiring about what is beyond; and "whether the infinite is beyond nature or the contrary, or whether there is anything in nature that can be called infinite." The mind "burns to possess denied knowledge and to tread forbidden ground." "But the deeper the mind seeks for the infinite the more it is involved in a labyrinth." Then follows a long list of the antinomies of thought upon the infinite. "Time is no more than a peculiar relation to modes proceeding from finite beings. . . hence time, space, motion, quantity all conspire and consent rationally in declaring that there is no infinity in any of them." The "philosopher concludes from the impenetrable mazes that while there can be no infinite there may be an indefinite, and so guesses that the Divine is the prime of nature and nature and God are in a measure one." But if the "mind begins to reason it cannot help going deeper and deeper," and the process must be the undeviating one of reason. "To convince reason, reason must be made use of," so that "when once the individual is convinced of reasons, especially in matters of faith, there is nothing whatever in loss of human delights or death itself that can afterwards make us swerve from them, so greatly does the mind respect itself." "The more knowledge we possess the more there is to make us happy and the more to make us unhappy. Hence a Christian Philosopher may be the happiest or unhappiest of mortals." (p. 232.) In nature the infinite is impossible, but just so truly does nature demand a cause in a self-causing infinite outside of itself. "In machinery what we really wonder at is the first cause; not considered as organic or mechanical, but cause in the person of the inventor; and not the inventor as he who made, but he who *invented,* that is, foresaw that the consequence would flow from that." "Can nature produce such a construction of parts? Can any machinery, without an infinite intelligence? without a cause in God?"

Depicting man as that culminating effect in creation through which

the final ends of the infinite are realized, we have this fine passage (p. 47):

"Man, as we all know well, was created to enjoy the delights of the world, and to possess the earth for himself and his posterity. Wisdom and reason were given him, to venerate and worship the infinite Deity, that he might better make use of worldly delights, and have a finer or more delicious sense of them, to lead him to associate them with heavenly ones also, to carry the world to a new perfection, which it could not attain without a material being and human means; lastly, to commence a life and existence which should thenceforth be eternal and immortal, that he might increase the number of the angels. And that man might accomplish these ends, a body was given him, and parts and members were added to the body, all conspiring to the same end; a head was given him, with a brain therein, and this brain endowed with senses, and the senses with a soul."

Treating of the "superlative mechanism of the senses" the author says: "As the learned world is continually engaged in exploring the mysteries of nature by experiment, there is no reason to despair of fruther progress, or of their ultimately reaching the soul, so as at all events to judge of its mechanical operation."

Describing the successive degrees of elements and the mechanism applicable to each he says: "The nearer they are to the simple the purer they are and the more approaching to superlative perfection in their mechanism and geometry," and "there are membranes in the human body to receive all the motions of the elements." In this way by a subtle contiguity there is a complete community of motion through all nature, and man, as the most perfect receptacle, receives the most perfect motion and has in him the capacity of reflecting the Divine itself and acknowledging and adoring God his author.

By examining the anatomy of the body in all its parts and organs and its action in all the faculties of imagination, memory, perception or will "we shall be enabled to arrive at the true geometry and mechanism of this most perfect entity." "Experience and geometry alone have a right to be affirmative and positive, and when they become so and not till then, by the consent of the soul the rationale of the subject is declared. The main end of these, our labors, will be to demonstrate the immortality of the soul to the very senses." Could anything seemingly be more analogous to the spirit of the modern laboratory research in physiological psychology? Could anything indeed be more materialistic than at first glance seems Swedenborg's reasoning regarding operation by contiguity even on the soul? Thus, on page 190, he argues: " . . . motion is nothing without substance, there is no motion without there be something to be moved. That is to say, every moving body supposes a mode proceeding immediately from a substantial, and acting immediately on a substantial." Surely the very extreme of materialism, one is ready to say. But when we come to study further

Swedenborg's theories of the "several elements connected by contiguity" (p. 191) and how they reach throughout the universe and are derivable from those subtler essences treated of in the *Principia,* as the elementaries and the finites, down even to the first finite, and the "pure simple;" so that "in the undulations of an element there may exist all the conditions on which the infinite variety of phenomena is explicable" (p. 200), and that "there is nothing to prevent new undulations from constantly entering an identical tremulous volume, and coexisting therein, a thousand-fold variety thus taking place in a single contiguum;" and when we refer to the earlier statement (p. 40), that "in the primitive element were present all things that, as regards time, were future," and that "the essential and absolute Cause was present in the primitive entity, and by its derivation through a succession of compounds completed the world in a continuous chain in one distinctive manner," and finally that this motion is imparted to the "primitive entity" by the conatus in the self-active Infinite itself, which, while it is incapable of motion or mutation, is yet capable of producing these *in itself as finited,* we see how Swedenborg really derives all motion and so all the soul's activity and susceptibility from things beyond matter, and so makes his substance embrace in its highest elements what we would denominate the spiritual, just as his mechanism embraces the free but orderly activity of will. "There is a mechanism in the effects and there *is a mechanism in the causes,* and this we continue to observe until the causes become so subtle that they at first begin to disappear and at last actually disappear from our senses. At this last juncture we find that we desire to deny mechanism to the vanished causes. It is, however, no sufficient reason against their mechanical nature to say that it is not sensible." (p. 148.)

The key to the whole system seems to be in the subtle but most significant principle of the Nexus laid down in Chapters IX. and X. of this work, for herein alone is the question answered how does the Infinite impart or originate motion in the first primitive of nature. The answer is through a nexus between the Infinite and the finite, "but not a natural, neither a mechanical, geometrical or physical nexus, nor one of any kind that has any analogy with the qualities of the finite. In a word we know that there is a nexus, but as to what it is we know nothing whatever." The great significance of this position in the history of philosophical development, as well as in connection with Swedenborg's own spiritual philosophy, is in its epistemological bearing, and hence its relation to idealism. Does the real lie in matter or in a world discrete from matter and from which matter is derived? Does the immaterial or ideal world create the material world or the reverse? How can any relation exist between two things having nothing in common like a world of thought and a world of extension? We see at once it was the problem which Kant hoped to have solved in his Critique by his doctrine of the *schemata* Time and Space as mental media by which the

extended world takes on reality to the human consciousness. Swedenborg likewise draws his nexus, his only possible bond of relation between mind and matter, and hence only possible means of knowing the latter by the former, not from matter, but from mind, since, while we do not know what this nexus is, we know "it is not natural, mechanical or physical." "The more acute philosophers have made out, that neither hearing nor sight have a real existence until the undulation reaches the inner parts and the senses themselves are taken into fellowship with the soul." (p. 170.) In other words, they have found as Kant found, that while we learn only from experience, yet experience means senses plus mind, and the organon or way by which sense serves mind is something created by mind alone and is *a priori*.

The new edition is furnished with an introduction by Prof. Lewis F. Hite, M. A., in which the doctrine of the "link" or nexus is distinctly set forth, and a contrast drawn between the pre- and the post-illumination period of Swedenborg and the two positions brought into harmony by the later doctrine of "God as Infinite Love" and the Universe "as Love in the manifestation of its self-representative and self-realizing activities." A comparison is made with Dedekind's theory of numbers and with Professor Royce's doctrine of self-representation. According to Professor Hite Swedenborg's "concept of the Infinite applies primarily to self-conscious activity; he also gave decisive hints of the application of the doctrine of self-representation by correspondence in the case of nature taken as a finite series with man as its last term, . . . and his work claims the merit of being the first serious undertaking to treat the subject in a complete way from a philosopher's point of view. It should also be stated in fairness that he brought philosophical reflection to the real issues of the problem and that he presented those issues so conclusively that subsequent reflection only emphasizes the importance of his work."

In retaining also the introduction furnished by Dr. Wilkinson for the first edition we would have been glad if the editors had offered some more worthy reason than that of the "high sanction given it by the favorable estimation and the personal friendship it won from Ralph Waldo Emerson." In view of the better understanding of Kant's system and the consequent laying aside of many mistaken notions regarding what was called his "Transcendentalism" the virulent assault upon his teachings by Dr. Wilkinson will seem altogether misdirected by modern scholars, and if logically examined quite as hostile to the metaphysical positions assumed by Swedenborg as to those of Kant. That what is declaimed against as "transcendental," namely, a substitution of mere mental fictions for the things really experienced is not what Kant meant by the "transcendent" is known to every beginner of his system, the "transcendent" being with Kant that principle of essential reality in all experiences without which they are impossible and yet which transcends the limitations of any single one, thus corresponding to the pres-

ence of the Infinite in finite things as a constant regulating end or rational principle whereby things of sense can be made intelligible to things of mind, and hopeless diversity and separation be brought into unity and harmony.

Especially unfortunate seems to us the objection so strongly urged by Dr. Wilkinson in his preface against Kant's doctrine of the phenomenality of the objects of our knowledge, and against his distinguishing between the objects and the "things in themselves," since it has been shown that by the "things in themselves" Kant meant only the spiritual realities which according to Swedenborg can only be known to the natural mind in their corresponding appearances, that is, as phenomena.

This experience throws important light upon the questions discussed by the Association as to the advisability of introducing interpretative prefaces to the new editions of Swedenborg, except such as shall be of a purely historical and bibliographical nature.

F. S.

**Psychology of the Nations.** *By A. L. Kip.. The Knickerbocker Press, N. Y.* 1902.

It is well-known that the nations of the world have peculiar mental and moral characteristics, as also distinctive physiological traits; and so the possibility of a psychology of the nations is granted. It is likewise an accepted doctrine of historical students that the physical features of a country help to mould and determine the character of the inhabitants.

Resting on this basis, the book before us proceeds to assign to each nation its proper function. In the prosecution of this task, however, the author while availing himself to some extent of recent ethnographical studies keeps these in a somewhat subordinate position, for the framework of the book and its method of procedure is drawn from a rather startling, not to say reckless application of Swedenborg's doctrine of correspondences. From this point of view, the book is, to say the least, a curious specimen and we will confine our notice to this aspect, since the ethnology it contains is of no peculiar importance.

After observing that the characteristics of a people are determined in the first instance by the country they live in, the author goes on to say, "A knowledge of the correspondence of a country is consequently necessary to explain the character of the inhabitants" (p. vii.). This statement is at once puzzling. It is admitted that there is a connection between the physical features of a country and the character and habits of the people, and we may very properly call this relation correspondence. But how can a country have a correspondence with psychological functions in advance of its special relation to its inhabitants? In short, what special and peculiar meaning does the author attach to the word correspondence in this sentence? This question the reader is left to answer the best he can. Indeed, the writer seems throughout to be altogether superior to the interests and the requirements of the ordinary

reader. The book moves along with monotonous self-complacency and a supreme confidence in its own inner self-sufficiency; and yet there is something decidedly attractive in the simplicity of its literary form and spirit. The reference in the foot-notes to Swedenborg and Worcester give us the clue we need to follow the method. Mr. Kip was a pupil of the Rev. John Worcester in the New Church Theological School, and seems to have had the usual experience of acquiring a profound admiration for him. But it must be very painful to the serious students of Mr. Worcester to find him imitated in this superficial way. As to the use the author makes of Swedenborg, perhaps we must accept it as inevitable if not legitimate for students to take Swedenborg's doctrines and apply and extend them as best they can. The question here, as in all such cases, is whether or not the doctrines have been correctly applied and extended. But this feature does not come within the scope of this notice. The immediate purpose is to exhibit the book and interpret it.

Simply stated, the main thesis of the book is this: The earth and its parts correspond to the mind and its faculties. "The correspondence of a land remains the same whether inhabited or uninhabited" (p. viii.). Making use of Swedenborg's general psychology and taking his cue from a few of the more familiar Bible correspondences, the author goes on to construct his scheme. Comparing the earth as a whole to the mind as a whole, "Its land corresponds to the natural feelings and its water to the natural thoughts" (p. i.). This is diagram I. Diagram II. places the earth, the brain and the mind in their correspondential relation as follows: The cerebrum, the seat of the intellectual faculties, corresponds to the eastern hemisphere ("the inhabitants of which have a greater aptitude for intellectual activity"); while the cerebellum, the seat of the emotional faculties, corresponds to the western hemisphere ("where the inhabitants tend mostly to emotional activity"). Diagram III. presents another view. "The southern hemisphere, being composed for the most part of water, represents the right or the intellectual side of the brain; and the northern hemisphere, being made up largely of land, represents the left or emotional side" (p. ii.). We observe that aside from the fact that the author here reverses Swedenborg's doctrine, he does not seem to be in the least troubled that diagrams II. and III. are inconsistent, so that Europe and Asia, for example, ocrrespond at once to the intellectual and to the emotional faculties. So too does South America. But confusion becomes worse confounded when we come to diagram IV., according to which the north corresponds to mere knowledge, the south to emotion, the east to abstract feeling (whatever that may be) and to abstract knowledge, the west to concrete feeling and motives (p. 4). To exhibit the futility of this scheme, it is only necessary to superpose these diagrams and observe that each country corresponds in every case to both sets of intellectual functions, and therefore to neither in particular. For example, Europe and Asia

being land would correspond to the feelings, but being in the eastern hemisphere, they correspond to the intellect; on the other hand, being in the northern hemisphere, they correspond to the feelings, but being north they correspond to mere knowledge. These difficulties and inconsistences, however, seem to offer no obstruction to the author. He calmly and confidently proceeds to assign each continent its proper correspondence, and then takes up the countries, islands, lakes and rivers.

"Australasia corresponds to the abstract emotional faculties; Asia to the abstract intellectual faculties; Europe to the concrete intellectual faculties; Africa to the emotional intellectual faculties; North America to emotional feelings; and South America to intellectual feelings" p. iii.).

Of course, this result or any other could be expected from the scheme, but why this particular result the author does not delay to tell.

The bulk of the book is made up of brief statements of the correspondence of the several countries and islands, in many cases down to small provinces and insignificant islands.

In view of the above scheme, we cannot, of course, expect any guiding principle, and in fact all that we actually find is a purely mechanical and arbitrary assignment of characters in terms which are drawn in large part, if not entirely, from Mr. Worcester's vocabulary, but from which Mr. Worcester's light and intelligence have escaped.

As specimens, take the following: Japan corresponds to the faculty of attention, attention to subjective knowledge with an effort to understand. As Japan occupies a sort of introductory position in relation to the rest of Asia, so this is one of the first and introductory intellectual faculties. China corresponds to inner memory, and so the inhabitants have a peculiar development of it. Australia corresponds to outer memory. But Indo-China, unexpectedly and quite inconsistently as a part of Asia, corresponds to good will, an emotional character. So too Palestine corresponds to veneration.

Europe, as we saw, corresponds to concrete mentality and we have a specimen of the author's psychology in the way he distributes concrete mentality among the various European countries. The British Isles correspond tothe faculty of judgment; Scotland, judgment as to what to learn; England, to judgment as to what to think; Wales, to judgment as to what to do, etc. The river Thames is the judging of facts in accordance with established laws and methods; Avon and Severn are judgments on the meaning of life in the abstract and in the concrete; the Tweed is judgment based on conclusive evidence, etc. France corresponds to the analytical faculty, Germany, to the synthetical, Greece to the faculty of comparison, Italy to volition, Spain to self-esteem, Switzerland to determination, Turkey to faith, etc.

From first to last we are at a loss whether to take the book seriously or in fun. It appears sometimes to be the mere play of haphazard fancy, sometimes as deliberate burlesque, sometimes it gives one the

impression of being a reckless and sacrilegious exhibition of inordinate conceit. Take for example some of the things said about the United States. To begin with we are told that the United States corresponds to love to God. Then we have the correspondence of many of the States, the great lakes and some of the rivers.

Maine is the love of abstract knowledge about God; New York is the desire to be like God in thought; New Jersey is love to God in form, or as a Divine Man; Virginia is the desire to be filled with God's spirit; Wisconsin is the knowledge of the Lord's Divinity; Minnesota is knowledge of God's greatness; Lake Superior is the knowledge of the Divine teaching as to the love of God; Lake Michigan is the knowledge of the particulars of the Bible; Hudson river is the prayer for the Divine guidance; the Mississippi is meditation on the greatness of God; the Ohio is meditation on His great knowledge and wisdom.

This is a specimen of the inconsistent, arbitrary and absurd detail in which the author indulges apparently without any sense of responsibility, without any regard for truth, or any feeling of reverence or religious earnestness.

It would be a waste of time to subject such a book to serious criticism from the philosophical point of view. As an essay in applying the doctrine of correspondences it may lead to closer and more systematic study by provoking attack. It certainly has the merit of boldness and directness, whatever may be said of its significance and strength. Whether successfully or not, the field is occupied, and the main thesis is grounded in our doctrines. The Church needs a more systematic and more critical exposition of the doctrine than we have either in Swedenborg or in Worcester. From this point of view, to say nothing of its loose and inconsistent psychology, the book before us is fatally defective by reason of its thoughtless use of abstract and arbitrary correlatives, such as east and west, north and south, internal and external, abstract and concrete, etc. Such expressions as abstract intellectualized emotion and concrete emotional intellectuality may very well characterize the book itself, but they seem to be hardly enlightening when used to define the psychological status of a nation.

LEWIS F. HITE.

# THE NEW PHILOSOPHY.

VOL. VI. JULY, 1903. No. 3.

## SWEDENBORG SCIENTIFIC ASSOCIATION.

### SIXTH ANNUAL MEETING.

THE Sixth Annual Meeting of the Swedenborg Scientific Association was held in the Kenwood Parish House of the Chicago Society of the New Jerusalem, corner 46th street and Woodlawn avenue, Chicago, Ills., Wednesday, July 1st, and Thursday, July 2d, 1903.

### FIRST SESSION.

WEDNESDAY, July 1, 2:15 P. M.

326. The meeting was called to order by the President, the Rev. Frank Sewall, M. A., D. D.

327. The minutes of the last annual meeting being in print, their reading was dispensed with.

328. The Chair appointed Messrs. W. L. Gladish and W. B. Caldwell a Committee on the Roll, who subsequently reported the following members and visitors in attendance on the Sessions of the Association:

### MEMBERS.

*Amherst, Mass.*, Prof. Thos. French, Jr; *Baltimore, Md.*, Mr. C. A. E. Spamer; *Cambridge, Mass.*, Rev. L. F. Hite; *Chicago, Ill.*, Rev. R. W. Brown, Rev. W. B. Caldwell, Mr. Paul Carpenter, Mr. Chas. T. Champion, Mr. L. S. Cole, Dr. E. A. Farrington, Mr. F. S. Layton, Mr. O. Scalbom, Rev. E. J. E. Schreck; *Chillicothe, O.*, Miss Carrie Sproat; *Cincinnati,*

*O.*, Rev. L. P. Mercer; *Detroit, Mich.*, Rev. John Whitehead; *Glenview, Ill.*, Dr. Harvey Farrington, Mr. Leonard Gyllenhaal; *Indianapolis, Ind.*, Rev. W. L. Gladish; *La Porte, Ind.*, Mr. Wm. Niles; *Los Angeles, Cal.*, Mr. S. McLaughlin; *Peoria, Ill.*, Mrs. V. H. Van Buskirk; *Pittsburg, Pa.*, Mr. C. H. Ebert; *Toronto, Canada*, Rev. F. L. Higgins; *Urbana, O.*, Prof. J. H. Williams; *Washington, D. C.*, Rev. Frank Sewall.

VISITORS.

*Amherst, Mass.*, Miss French; *Baltimore, Md.*, Miss Lois Spamer, Miss Bona P. Spamer; *Bath, Me.*, Rev. G. H. Dole; *Brockton, Mass.*, Rev. L. G. Hoeck; *Brookline, Mass.*, Rev. C. W. Harvey; *Brooklyn, N. Y.*, Samuel L'Hommedieu; *Chicago, Ill.*, Mrs. Robert Braden, Mrs. Edwin Burnham, Mrs. C. T. Champion, Mr. Espy Curtis, Mr. C. H. Cutler, Miss Nan Gladish, Mrs. E. A. Munger, Mrs. G. H. Owen, Miss Clara Rauch, Miss Winifred Scammon Reed, Mrs. Louis Rich, Rev. J. S. Saul, Mr. W. F. Smith, Miss Flora Trine, Miss Adah Wallenberg, Mr. W. S. Weller; *Chillicothe, O.*, Miss Emma Sproat; *Cincinnati, O.*, Miss Brown, Mrs. Hunt, Mrs. Carpenter, Miss Emily W. Martin; *Denver, Colo.*, Miss Mary L. West; *Kansas City*, Rev. Harry C. Vrooman; *La Grange, Ill.*, Miss Alice D'Avignon; *Philadelphia, Pa.*, Rev. W. H. Alden, Mr. G. H. Smith, Mr. J. W. Stockwell, Jr.; *St. Louis, Mo.*, Miss Lucy C. Ross, Miss Lily A. Ross; *Waltham, Mass.*, Mrs. Emma R. Perry.

329. The report of the Board of Directors was read.

330. On motion of the Rev. L. P. Mercer, voted that the report be received and the recommendations and actions approved and adopted, with the exception of the reference to the publication of the MSS., consideration of which is postponed until the reading of the report of the Committee on MSS.

331. Rev. W. B. Caldwell moved the adoption of the following resolution:

*Whereas*, During the past year this Association has lost a valuable member and officer in the departure from this world of Mr. Carl Hjalmar Asplundh;

*Be it resolved,* That this Association do now express as a Memorial to Mr. Asplundh its hearty appreciation of the services rendered by him as Treasurer and Publishing Manager, and its keen sense of loss in the absence of his earnest interest and vigorous attention to the uses of this body.

332. After appreciative remarks of Mr. Asplundh's character and ability by Messrs. Caldwell, Mercer and Sewall, the resolution was adopted by a unanimous rising vote.

333. The report of the Secretary was read and accepted.

334. The report of the Treasurer was read and received.

335. The Chair appointed Prof. Thos. French, Jr., and Mr. Wm. Niles to audit the Treasurer's report.

336. The report of the Committee on a new edition of the Principia was read and accepted.

337. The Secretary read a letter from W. H. Masser, U. S. N. (retired), referring to a paper written by himself on the "Nebular Hypothesis," in which he reviews past theories and presents his own. Having been told that his theory is similar to that of Swedenborg's "Principia," he writes for a copy of the work.

338. The hour for the delivery of the President's annual address having arrived, Dr. Sewall read the same.

339. The Chair invited nominations from the floor for the Committee of Nominations, and the following Committee was in this manner appointed: Dr. Harvey Farrington, Rev. W. B. Caldwell, Prof. Lewis F. Hite, Rev. L. P. Mercer, Prof. Thos. French, Jr.

340. *Voted* that the election of officers be made the order of the day at 10:30 o'clock tomorrow morning.

341. A paper by Mr. Alfred H. Stroh, entitled "A Review of the Course of Swedenborg's Science in Sweden," was read.

342. A letter by Prof. Gustaf Retzius, M. D., Chairman of the recently appointed Swedenborg Committee of the Swedish Academy of Sciences in Stockholm, to Dr. Frank Sewall was read, after introduction by Dr. Sewall.

343. A report from Mr. Alfred H. Stroh regarding his work on MSS. was read and received.

344. The report of the Committee on the publication of Swedenborg's scientific MSS. was read and received.

345. It was moved that the recommendation of the Board of Directors regarding the enlargement of the Committee with the additional nomination of the Treasurer and Messrs. Arthur W. Burnham, of Chicago, and Horace P. Chandler, of Boston, be adopted.

346. On motion it was voted that the recommendation be amended so as to admit of the additional appointment of Mr. Alfred H. Stroh.

347. *Voted* to adopt the recommendation of the Board of Directors as amended, and the President, the Treasurer, Mr. Alfred Acton, Mr. Arthur W. Burnham, Mr. Horace P. Chandler and Mr. Alfred H. Stroh were declared to be the Committee on the Publication of Swedenborg's Scientific Manuscripts.

348. The report of the Committee on a New Edition of the Animal Kingdom was read and received.

349. The report of the Committee on the Transcription and Translation of the Lesser Principia was read and received.

350. The report of the Committee on the Translation of the Work on the Senses was read and received.

351. It was reported on behalf of the Committee on the Translation of Swedenborg's Early Swedish Scientific Treatises that nothing has been done during the past year.

352. An informal report by Mr. Edmond Congar Brown of the Committee on Incorporation, was read, and the matter of incorporation of the Association was left in his hands.

353. A communication from the New Church Philosophy Club of Pittsburgh was read and received.

354. On motion, duly seconded, *voted* that when we adjourn we adjourn to meet again on the morrow at 9:30 o'clock A. M., and at once consider the report of the editor of *The New Philosophy.*

355. The report of the editor of *The New Philosophy* was read.

356. Notice was given that three papers had been prepared for the meeting, one on Salt, one on the Ether, and one on the Appendix Vermiformis.

357. On motion, duly seconded, adjourned.

## Second Session.

Thursday, July 2, 10:00 A. M.

358. The meeting was called to order by the President.

359. The minutes of yesterday's session were read and approved.

360. According to resolution [minute 354] the report of the editor of *The New Philosophy* was declared to be the order of the day.

361. The report was read.

362. Prof. L. F. Hite moved the adoption of the following preambles and resolution:

"*Whereas,* The Swedenborg Scientific Association is unwilling to modify its organic law and change the scope and purposes of the Association, and

"*Whereas,* The report of the editor of *The New Philosophy* presents the alternative of such modification and change so far as affecting the nature of our Magazine, or his resignation;

"*Resolved,* That the Association, in full and hearty recognition of his valuable services and in high appreciation of his frankness in stating his views, accepts the resignation of Dr. John R. Swanton as editor of *The New Philosophy,* to take effect January 1, 1904."

363. The resolution was discussed by Messrs. Hite, Mercer, Whitehead, Caldwell, Harvey Farrington, and French.

364. The hour of 10:30 o'clock having arrived, the order of the day—the election of officers—was called for.

365. The Committee on Nominations reported the following nominations:

*President,* Rev. Frank Sewall, M. A., D. D.; *Secretary,* Rev. Eugene J. E. Schreck, M. A.; *Treasurer,* Rev. Charles E. Doering *or* Mr. Robert B. Caldwell, Jr.; *Additional Members of the Board of Directors,* Rev. Lewis P. Mercer, Hugh L. Burnham, Esq., Rev. John Whitehead, M. A., Harvey Farrington, M. D., Rev. Alfred Acton, Rev. Willis L. Gladish, Rev. Lewis F. Hite, M. A., John R. Swanton, Ph. D., George M. Cooper, M. D.

366. On motion, duly seconded, *voted* to ballot for President, Secretary and Treasurer on one ballot.

367. Pending the election, Prof. Hite's resolution [minute 362] was considered, and on motion, duly seconded, *laid on the table.*

368. On motion, duly seconded, *voted* that the Chair appoint a Committee to reply to Mr. Stroh's communication regarding his work on the MSS., and also to send greetings to the Swedish Academy of Sciences.

369. The tellers reported that the following officers had been duly elected: *President,* the Rev. Frank Sewall, A. M., D. D.; *Secretary,* the Rev. Eugene J. E. Schreck, A. M.; *Treasurer,* the Rev. Charles E. Doering.

370. The meeting proceeded to vote for additional members of the Board of Directors. In addition to the nominees of the Committee on Nominations the following gentlemen were nominated from the floor: Prof. Thomas French, Jr., Mr. Robert B. Caldwell, Jr.

371. Pending the election, the Chair announced the Committee to reply to Mr. Stroh and to send greetings to the Swedish Academy of Sciences [minute 368], the President, Prof. L. F. Hite, A. M., and Prof. Harvey Farrington, M. D.

372. On motion, duly seconded, *voted* that this Committee be accorded the privilege of reporting later to the Secretary, and that their report be printed in the Journal.

373. The Committee to audit the Treasurer's report reported that they were unable to verify the same owing to the absence of vouchers.

374. On motion, duly seconded, *voted* that in view of the inability of the auditors to examine the Treasurer's vouchers, further auditors residing near the Treasurer be appointed.

375. The Chair appointed Mr. John A. Wells and the Rev. Alfred Acton a Committee to audit the Treasurer's report.

376. A communication from the Swedenborg Philosophy Club, of Chicago, was read and received.

377. A letter from Louise M. Fuller, of Jacksonville, Fla., referring to the recent death of Dr. Hiram K. Jones, was read.

378. A letter from Mr. William Smith, of Johnstone, Scotland, appointed Biographer of Swedenborg by the "Evidence Society," of Scotland, was read.

379. On motion, duly seconded, the subject of honorary

membership in the Association was referred to the Board of Directors, to report to the next annual meeting of the Association.

380. The tellers reported that of the eleven nominees for the Board of Directors the following eight were elected: Rev. L. P. Mercer, Harvey Farrington, M. D., Rev. Willis L. Gladish, Mr. Robert B. Caldwell, Jr., Rev. Alfred Acton, Rev. John Whitehead, Hugh L. Burnham, Esq., Prof. Thomas French, Jr.

381. The meeting proceeded to vote for the ninth additional member of the Board of Directors.

382. Prof. Hite's resolution was on motion, duly seconded, *taken from the table* [minutes 362, 367].

383. The President called the Rev. John Whitehead to the chair and entered into the discussion of the question.

384. The President resumed the chair, and the question was discussed by Messrs. Whitehead, Harvey Farrington, Hite, Schreck and Caldwell.

385. The resolution was unanimously *adopted.*

386. On motion of the Rev. John Whitehead, duly seconded, *voted* to *refer* the matter of electing an editor of *The New Philosophy* to the Board of Directors, and that the members of the body be invited to communicate to the President their ideas as to a suitable editor, and as to the future policy of the Magazine.*

387. The tellers reported that Prof. L. F. Hite, M. A., had been elected the ninth additional member of the Board of Directors.

388. On motion, duly seconded, *voted* that the determination of the time and place of the next annual meeting be *referred* to the Executive Committee.

389. The Rev. Wm. B. Caldwell moved that the thanks of the Association be tendered the Kenwood Parish of the New Jerusalem for the privilege enjoyed in holding the meetings in their commodious and handsome new buildings.

390. Adopted by a rising vote.

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*At a meeting of the Board of Directors the time limit in which communications on the subject are to be sent to the President was fixed at September 1, 1903.

391. The Rev. John Whitehead moved that the Swedenborg Scientific Association hereby expresses its hearty appreciation of the kindly hospitality of the Swedenborg Philosophy Club, of Chicago, in their entertainment of this body last evening.

392. Adopted by a rising vote.

393. On motion, duly seconded, adjourned.

## MEMORANDUM.

The Swedenborg Philosophy Club, of Chicago, had made preparations for a banquet on the evening of Wednesday, July 1st, when about fifty ladies and gentlemen sat down to dinner at the Albion, on Michigan Boulevard, Chicago. In the course of the evening the following toasts were proposed, the President of the Club, the Rev. E. J. E. Schreck, acting as toast-master:

1. The Swedenborg Scientific Association. Responded to by the President of the Association, the Rev. Frank Sewall.

2. The Swedish Academy of Sciences and Dr. Retzius. The Rev. L. F. Hite.

3. Our Young Champion in Foreign Lands (Mr. Alfred H. Stroh). The Rev. Louis G. Hoeck.

4. The Relation of Modern Science to the Philosophy of Swedenborg. Prof. Thomas French, Jr.

5. The New Church Board of Publication and its New Edition of the *Economy*. Dr. Harvey Farrington.

6. The London Swedenborg Society and its New Edition of the *Infinite*. The Rev. Willis L. Gladish.

7. The Use of the Swedenborg Scientific Association to the New Church. The Rev. Wm. B. Caldwell.

8. The New Philosophy. The Rev. L. P. Mercer.

9. Urbana University,

10. The Academy of the New Church.

11. Good Fellowship of Divergent Minds. Rev. John Whitehead.

12. Our Sister Philosophy Clubs of Bryn Athyn and Pittsburg. Rev. R. W. Brown.

13. Financial Support of the Swedenborg Scientific Association. Hugh L. Burnham, Esq.

## THE ANNUAL ADDRESS OF THE PRESIDENT.

It is gratifying to report on this our coming together in the Sixth Annual Meeting of our Association that in all the several lines of use named in our rules of organization progress has been made during the past year, and in some of these to an extent and by providential means of which we had little anticipation a year ago. We seem to have entered upon an era of new interest in the scientific and philosophic writings of Swedenborg, and we may feel the pleasant assurance that our endeavors to bring to light those of them which have never yet been seen and read, and to republish those which have been for years out of print and inaccessible, are designed to meet an already existing demand on the part of the scholars of our day, as well as to awaken new inquiry and new interest.

The interest shown last year by Dr. Neuburger, of Vienna, in Swedenborg's work on the brain and his inquiries of the Swedish Academy of Sciences for further information from unpublished MSS. of that great work, the visit of our own diligent scholar and investigator, Mr. Alfred H. Stroh, to the same Academy of Sciences for the prosecution of the work of copying for publication all the remaining unphotographed or unpublished scientific writings of Swedenborg, happily were both coincident with, and a lively stimulus to, the newly revived interest of the Swedish Academy itself, and notably of the distinguished physicist, Dr. Gustaf Retzius, in Swedenborg's scientific studies. The result has been gratifying beyond our expectation, inasmuch as we find not only our efforts in rescuing from destruction and oblivion these valuable but priceless works cordially seconded by the authorities of the Academy of Sciences, but also what we might call almost a rival work among the learned scholars of the Academy itself in investigating the contents of these works and having them given to the world under the auspices of the institution itself of which Swedenborg was a member, and under whose roof they have been preserved.

It is a matter of special gratification, therefore, that among those co-operating with our Association, together with the Academy of the New Church, and the General Convention of the New Jerusalem in America, which bodies have given liberal financial assistance, we may name the Royal Academy of Sciences in Sweden whose committee of distinguished scholars will further both in research and in publication the common aims we have in view.

I

In the Section of our work devoted to *Preservation* we may report:

(a) The completion of the copying of the work on "Salt," and its publication begun in the original Latin in a volume of some 300 pages containing the illustrations referred to by Swedenborg, reproduced from the publications in which they appeared.

The copying of all the remainder of the scientific MSS. in the Library in Stockholm embraced in our original enterprise is nearly completed, amounting in all to some 2,000 pages. The reason for publishing the work *De Sale* in Latin is that it seemed of the first importance to preserve Swedenborg's actual texts themselves so that they might be studied hereafter at first hand by those engaged in special research, and be equally accessible to those of all nationalities. When the original Latin works are once secured, by multiplication and distribution of copies, from destruction and decay, then the work of translation may easily be undertaken whenever or wherever a special demand shall arise.

(b) *"The Lesser Principia,"* the transcription of which was reported as completed and the translation into English begun last year ("The New Philosophy," 1902, p. 127) by the committee of our Association, Mr. Acton, has, we are happy to learn, been also selected for publication from the photolithographs by the committee of the Academy of Sciences of Sweden, and in this way a very considerable burden is taken from our shoulders as well as a great encouragment given by the appreciation thus shown by our undertaking. The proofs have

already appeared of a number of pages of this Latin edition of this important work, which occupies 342 pages of the photolithographed MSS. (Vol. V., pp. 103-444), and contains 174 chapters.

## II.

In the Section *Translation and Publication* we have to mention:

(a) The completion by Mr. Stroh of a revised translation of the work on the *Worship and Love of God,* Parts I. and II., and his first translation from the photolithographed MS. of Part III. of this unique and remarkable work. While the final revision of the English version, in which were found many inaccuracies and inelegant renderings, has not been entirely completed, the earlier pages of the work have already been sent to the printers, and the proofs of a considerable portion made in large type and pleasing style have already appeared. As the volume will be one of beauty in its mechanical make-up befitting the rare beauty of its contents, the final and fairest outcome of the author's period of classical and literary writing and rational philosophizing, the volume will necessarily be expensive, and the present number of subscribers to the volume will have to be considerably increased in order that it may be published without serious loss to the Association.

(b) Under this head should also be mentioned the appearance in "The New Philosophy" (1903, p. 20) of the small hitherto unpublished treatise of Swedenborg "On the Causes of Things," and also

(c) The beginning of the "Summary of the Principia," Chapters I.-IV. (N. P., 1903, p. 8), both being transcribed from the original MSS., and translated by Mr. Stroh, and the latter furnished with an introduction taken from Swedenborg's own introduction to the "Principia" itself. This summary presents thus far in a very condensed form the system of the development of the universe from the first entity, or point, produced by the Infinite, through conatus and the motions of various orders.

(d) Mr. Price has continued his translation of Swedenborg's

work on "The Senses," being Part IV. of the "Animal Kingdom," bringing the translation as far as to Chapter V. "The Ear and Hearing," thus to less than one-fifth of the whole work. The chapters appear in successive numbers of "The New Philosophy."

As this will be the most convenient place to mention our quarterly publication, "The New Philosophy," I will make a few suggestions here in reference to the twofold use this journal is designed to perform, with a view to economy and greater efficiency in the performance. A glance at the past numbers of our quarterly since it has been published as the bulletin of our Association, will discover several valuable treatises of Swedenborg here first put into English, but because mingled with other articles and left in the ephemeral form of a periodical these are really buried out of the sight of practical scientific research, and thus a considerable amount of labor in translating and of expense in printing has been, comparatively speaking, thrown away.

The treatises already appearing in this way are: Swedenborg's "Notes to the Principia," being extracts from his Journal of Travels during the year 1733: transcribed from the photolithographed MS. and translated by the Rev. Reginald Brown ["The New Philosophy," October, 1900, p. 134].

The work "On the Senses," being Part IV. of the "Animal Kingdom," translated by the Rev. Prof. Price, and now appearing in sections.

The small work on the "Causes of Things," translated by Mr. Stroh, and the

"Summary of the Principia," translated from the photolithographed MS. by Mr. Stroh, and inserted in the last two numbers of "The New Philosophy."

These valuable new contributions to our store of Swedenborg's science in English are, as I have said, practically lost to the scientific world at large, so long as they are hidden away with other matters of minor value in the numbers of our bulletin, especially as these are furnished with no complete index of contents at the close of each volume.

It would seem, therefore, that steps ought to be taken at once

to have all these serial publications of Swedenborg's works hereafter appearing in our bulletin so placed and so printed that the sections as they appear may be preserved in extra sheets for binding when each work is completed in a volume by itself. Provision should also be made for reprinting the tracts that have already appeared, in an initial brochure, and for continuing regularly as the most important use of the bulletin, to print new installments of the works as translated, in a uniform style for binding in volumes. Measures should be taken for indexing the annual Vols. of the quarterly, including in the first index the contents of all the numbers thus far published.

The other use of our bulletin is identical with the remaining Section of our Association's prescribed duty that of—

"The *promotion of the principles taught* in these works, having in view likewise their relation to the science and philosophy of the present day."

This use is quite distinct from that of publishing in serial form the scientific writings of Swedenborg in first translations and of quite secondary importance. It can, perhaps, best be performed in the way of note and comment by our ablest scholars on the current theories in science and philosophy, bringing these into comparison with the principles of Swedenborg's system, and thus not only interesting the writers by candid and able criticism but opening to their view the true philosophy we are endeavoring to inculcate.

But to return to our second Section, viz.: The publication and distribution of the scientific works. We have to notice with pleasure the appearing during the past year of two important works which have long been out of print; the work "On the Infinite," for whose handsome new edition we are indebted to the Swedenborg Society of London, and "The Economy of the Animal Kingdom," in five volumes, published by the New Church Board of Publication in New York. Both of these works appear with unamended translations, and the New York edition of the "Economy of the Animal Kingdom" is an exact reprint of the edition of 1868, being the translation of the Rev. Augustus Clissold, and without other introduction or preface than that of Swedenborg.

While there is reason to believe, judging from the other works of the same translator, that the version of this work might have been improved by a careful revision, and while the retaining of the title "Animal Kingdom" as the most suitable translation of "*Regnum Animale*" is a matter of serious doubt and might preferably have been discussed with a view to uniformity with the new edition of the "Animal Kingdom" which our committee is preparing, still our Association will hail with much satisfaction this handsome edition of so important a work and one so long out of print, and we appreciate highly the enterprise and liberality of the Board of Publication in forwarding by so essential a contribution the work we have at heart.

The volume "On the Infinite" is in the translation of Dr. James John Garth Wilkinson, as published in 1847, and retains the introduction by the translator to that edition, besides furnishing a new introduction prepared by Professor Lewis F. Hite.

Of the new introduction we will not speak, as it was given us in outline by the author at our last annual meeting.

The introduction written by Dr. Wilkinson, whatever may have been its usefulness at that date, seems untimely now when the attitude of the British mind toward the Kantian philosophy, against which Dr. Wilkinson so violently inveighed, has decidedly changed, and when a more intelligent appreciation of the idealistic movements of the time in which Kant and Swedenborg were contemporaries find them looking toward the same great truth, however different their philosophic methods in showing it forth. Kant's world of "things in themselves," which is a distinct world and a world more substantial than that of the phenomena of matter and known to our senses, is nought else than Swedenborg's world of spiritual substances alike known to us only through their appearances or correspondences in time and space.

The "*sicut a se*" principle which pervades the entire philosophy of Swedenborg is the very principle that Kant contends for, and which Dr. Wilkinson in his mistaken zeal for "realism" cries out against. There is but one reality, one "thing in itself" absolutely, and that is the Divine; all the rest

is appearance: morally in man, appearance as of living of himself; physically in things appearing to man as having their being in themselves. What is matter but the appearing of the all Divine reality to man's senses? What are time and space but the appearing to man's limited sense of the eternal and the infinite? What is nature in this whole mechanical and geometrical world but the passing of the infinite reality under the lenses of our finite vision, and our being enabled to see the infinite as finite, the spiritual as natural and God as man—"Alles vergangliche ist nur ein Gleichniss," said Goethe, "All that does pass away is only a likeness," an appearing of the real and eternal. Says Swedenborg in "The Divine Love and Wisdom," 299:

"The Lord cannot present Himself to any angel or man, as He is in Himself and in His own sun; therefore, He presents Himself by such things as can be received, as to love by heat, as to wisdom by light, as to use by the atmosphere."

It is against this very distinction by discrete degree between the spiritual and the natural which Swedenborg insists upon and Kant was striving for that Dr. Wilkinson in his unfortunate introduction seems to assail by insisting on the reality *in se* of the material and the mechanical and in the non-reality of the ideal. He places himself in opposition not only to the attitude of the new introduction of Professor Hite, but to the fundamental principle of the very work he is introducing, namely, the principle of the infinite transforming or veiling himself in images of the finite in order to create a world and make possible a heaven; and being thus out of harmony with what precedes and what follows it we cannot regard even the "favor and friendship" which its literary style won from Ralph Waldo Emerson,—the only reason offered by the editors for retaining this introduction,—as warranting its reproduction in this otherwise so attractive edition.

While other treatises long or short of a physical nature, notably the "Lesser Principia" of 1720, the "Chemistry" of 1721, antedated by more than a decade this work entitled "The Forecast of an argument on the Infinite and the Final cause of Creation," yet belonging as they do to the Principia or Physi-

cal series of studies, they do not displace this treatise on the Infinite as the real initial work of the whole great series of Swedenborg's writings viewed in its entirety, for these writings, as indeed the whole message of this mighty philosopher of the heavens and the earth, had their course *from the Infinite to the Infinite,* and it is only against this beckground of the doctrine of the Infinite that we can see aright any of the positions taken in the physical and anatomical series, or understand what is really more important, the relation of Swedenborg's earliest work as a scientist to his latest work as a seer and revelator.

A great work remains for the students of Swedenborg to accomplish, and one, it were to be wished, could be taken in hand at an early day, that of classifying the works of Swedenborg, not merely chronologically or in the order of their appearing, but intrinsically according to their several places in a great human system of soul, body and world. In such system we should see why the work on the "Infinite," and the "Final Cause of Creation" must necessarily precede the works relating to the created world itself in the order of conception, whatever may have been the order of the actual writing or publication of the several works.

For the complete series presents to our view three vast realms, two of them infinite, and between them the realm of the finite. But the first Infinite differs from the last, inasmuch as the first is the vast abyss of ends existing potentially in Divine Love, but as yet "seen by no man," or at best only vaguely conceivable or definable by the human intelligence; in the other infinite these ends find their realization no longer in an abyss but in a heaven of distinct individual immortal forms and activities and the transition from one infinite to the other is through the interlying realm of the finite, a world of time and space and of individual minds created to live as of themselves and apart from the Infinite, only that they may find and know their place in the other infinite, as the realization of the ends of the Divine Love their Creator. These ends in the first Infinite are as yet unknown and unknowable because as yet—speaking in the order of time—unrevealed. But they are there in their individual entities and the very infinitude of them makes up the Infinity

of God Himself. For the definition of the Infinity of God as given by Swedenborg is not mere negation of the finite, not a mere blank or formless abyss. *"Deus infinitus est,"* says Swedenborg, *"quia infinita in se habet."* God is infinite because he has infinite things in Himself.

This new substantial description of the Infinite is, it is gratifying to see, adopted by one of our most able philosophers, Professor Josiah Royce, who in his recent article, "On the Concept of the Infinite," remarks:

"My discussion of the concept of the Infinite will have relation not so much to the concept of infinite magnitudes (such as the ordinary Euclidean space when it is viewed as possessing volume) but rather to the *concept of collections,* whose units exceed in number the number of any finite collection of units. The conception of infinite magnitude, such as an infinite mass, usually requires for its statement certain conventions regarding the measurements of magnitude which do not here need attention. I shall confine myself to defining infinite collections and infinitely complex systems of objects. We shall see that the metaphysical, and in particular the theological, applications of our concept of the Infinite are especially related to this aspect of our topic, while the conception of an infinite magnitude in the narrower sense of that term, has less philosophical interest."

The course I have said in Swedenborg's treatise is from the Infinite unrevealed, through the Infinite revealed to the Infinite realized in its accomplished ends.

In this translation through the realm of the finite, the Infinite, by a plan conceived only in itself, assumes the plane or degree of existence adapted to the capability of human and finite knowledge and experience.

In terms of science it is the translation of conatus and motive and idea into the forces and forms of nature.

In the terms of cosmogony it is the translation of Divine Providence into exact mechanism and natural law.

In the terms of ethics it is the translation of the Divine sovereignty into human moral sense, freedom, self-control and responsibility.

In terms of the divine it is the incarnation of the Father in the Son of God by whom is the reconciliation and redemption

*See Hibbert's Journal, Vol. I., No. 1, p. 25.

of the otherwise forever alienated creature. In the first Infinite is the human as conceived in the divine Love and as a potential existence; in the realm of the finite this human is made actual by the bringing of the divine into finite human knowledge "the Word made Flesh," and so into multiform human experience—the Word fulfilled in a life in the world. In the other infinite it is this humanity ascended and glorified and made the realization of the ends of Divine Love by its being made One with the Father, and by an infinity of human souls being made one in them. "I in Thee and Thou in Me that they may be made one in us."

In such a course as this may we not see the present work "On the Infinite" in its true relation to all the other works? May we not see the sublime effort to conceive of that original motive and conatus in the Infinite which is really the generating purpose and origin of a world of perfect mechanism and order?

May we not see in the "Principia" series the tracing of the Infinite through this mechanical world of the finite in the evolution of the elements and of the kingdom of nature? Then in the anatomical series the tracing of the Infinite in the soul ordering and presiding over its own realm, its *Regnum Animale,* subordinating the body and all nature to the law of use and of worship? and, finally, in the books of revealed theology and Angelic Wisdom, the Infinite forever realizing its ends in a heaven of souls made blessed in a world beyond time and space, the eternal City of God?

FRANK SEWALL.

## LETTER FROM DR. RETZIUS.

To Rev. Frank Sewall, President of the Swedenborg Scientific Association, Washington, D. C.

*Dear Sir:*

As the President of the Swedenborg Committee of the Swedish Academy of Sciences in Stockholm, I beg to acknowledge the receipt of your kind letter of 25th March, on the permission of transmiting the transcription of the fifth Vol. of the Photolithographed MSS. of Swedenborg containing *De Cerebro* and *De Morbis cerebri* that belongs to the library of the Urbana University, Ohio, U. S. A., and embraces in all 935 pages.

I beg now at the same time to acknowledge the receipt of the copy of these manuscripts through Mr. Alfred Stroh, and to expres the sincerest thanks of the Committee. It will be for our work of a great value, and we will take the greatest possible care of it, that it may be returned to you in good and safe condition as soon as our work is brought to an end.

We have begun with the printing of some earlier manuscripts of physical and cosmogonial content, and will afterwards, as soon as possible, go on with the geological and then with the anatomical.

Our friend, Mr. Alfred Stroh, whose help in this work is quite invaluable, has had the kindness to promise to compare the above MSS. on the Brain with the original MSS. for revision. Without his great acquaintance with the style and writings of Swedenborg, as well as his enthusiasm for the work, it would be to us, the members of the Committee, who do not possess this special knowledge and who besides this charge are overwhelmed by work, almost impossible to bring the printing of the MSS. to an end. We are really very glad to have Mr. Stroh at our side.

Believe me, dear sir, yours very sincerely,

Gustaf Retzius,

*Prof. Dr. of Med.*

Stockholm, May 7, 1903.

# REPORTS OF OFFICERS AND COMMITTEES.

## REPORT OF THE BOARD OF DIRECTORS.

1. SINCE the last annual report of the Board of Directors, three meetings have been held, one in the afternoon of May 29, 1902, another in the evening of the same day, and the third on July 1, 1903.

2. In accordance with minute 314 of the last annual meeting, referred to it by the Association, the Board appropriated the sum of fifty dollars for the use of the treasurer's office during the ensuing year.

3. In accordance with minutes 285 and 286 of the last annual meeting of the Association, the Board decided to leave the transcript of the "Lesser Principia" in the hands of the present translator, with the understanding that he shall return the work, when completed, to the Board of Directors.

4. The Board unanimously decided to place "The New Philosophy" in charge of one editor, and appointed Dr. John R. Swanton to the office for the ensuing year.

5. The Rev. Willis L. Gladish offered to write an account of the meeting of the Association at Bryn Athyn for the "New Church Messenger" and "Morning Light."

6. The Board authorized the Executive Committee to publish the "Worship and Love of God," and "Diseases of the Fibre."

7. In accordance with minutes 310 and 311 of the Association, the Board referred the matter of incorporation to a Committee consisting of Messrs. Carl Hj. Asplundh and Edmond Congar Brown.

8. All these matters were attended to at the meeting on May 29th. In the meanwhile the Treasurer of the Association, Mr. Carl Hj. Asplundh, was called to the Spiritual World, and the vacancy thus created was filled by correspondence among the members of the Board, resulting in unanimous choice of the Rev. Charles E. Dœring, of Bryn Athyn, Pa., to fill the vacancy until the next regular annual meeting of the Association.

9. At the meeting of the Board held July 1st, the Executive Committee reported that they had called the annual meeting of the Association at the Kenwood Parish House, for July 1st and 2d, and submitted a printed programme, which was adopted.

10. The Executive Committee also reported that the funds in hand had not permitted the publication of the "Diseases of the Fibre."

11. The Executive Committee further reported that they had appointed Mr. Alfred H. Stroh to edit the "Worship and Love of God."

The publication of this work is in progress, although the probable cost of the work will exceed the original estimate, and probably require that a higher price be fixed on the work as offered for sale.

12. A letter from Dr. C. Riborg Mann, a member of the Board of Directors, indicating his withdrawal from membership was received, and his resignation accepted.

13. The Board adopted the following preamble and resolution:

"*Whereas,* It appears from the report of the Committee on the Publication of Swedenborg's MSS. that more money is needed to continue the work;

"*Resolved,* That the Committee be enlarged to five, and they be instructed to solicit subscriptions for the continuation of the work according to the original plan.

"*Resolved,* That the Board of Directors recommend to the Association to add to the present membership of the Committee on the Publication of the Manuscripts, the names of the Treasurer, Arthur W. Burnham, Esq., and Mr. Horace P. Chandler."

14. The Board also voted to reimburse the President of the Association the expense of sending the Urbana manuscript of Swedenborg's work "De Cerebro" to the Swedish Academy of Sciences.

EUGENE J. E. SCHRECK,
*Secretary.*

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LETTER FROM THE SWEDENBORG SOCIETY OF LONDON.

(Received since the annual meeting.)

DEAR DR. SEWALL:—

Letters from you have been before the last two meetings of the Committee of this Society.

(I) With respect to *The Principia,* the following paragraph from the report will tell you the situation:

"With respect to 'The Principia,' it was expected that the forthcoming edition would have been so far advanced as to enable your Committee to report the possibility of an early publication, but the English editors, the Rev. J. R. Rendell, B. A., and the Rev. I. Tansley, B. A., have found the work involved greater than was at first anticipated, entailing revision of the present translation. The work, however, is in active preparation, and the new edition will be issued as speedily as the circumstances will allow."

(II) The copying of the Scientific MSS. and data of Swedenborg does not specially commend itself to the Society, and still less the means by which it is being done, which seems to them to give no guarantee of exactness, and, therefore, of being a substitute of the original, leaving the question of the value of these MSS. on one side for the present, which is challenged by some of our members.

(III) The committee are contemplating the execution of a much more

important work than this on their own account in the phototyping of *the Index Biblicus,* and if that is undertaken that will, together with *The Principia,* to what they are already committed, be as much as they can undertake for some years to come.

Believe me, faithfully yours,

JAMES SPEIRS,
*Secretary Swedenborg Society.*

London, June 27, 1903.

## REPORT OF THE SECRETARY.

*To the Swedenborg Scientific Association:—*

The minutes and reports of the last meeting, together with the Constitution and By-Laws of the Association and lists of officers, committees and members, were published in *The New Philosophy* for July, 1902. The list of members was revised up to the date of publication.

During the year sixteen names have been stricken from the roll in accordance with minute 160, and twenty-five new members have been received.* Five members have died since our last annual meeting, Mr. Carl Hj. Asplundh, the Rev. Myron G. Brown, the Rev. Emanuel F. Gœrwitz, Mr. E. V. McCandless, and Mr. J. H. Ruby, leaving the present membership 189.

The Secretary communicated with the Rev. James Hyde (minute 263) and received the reply that all the particulars relating to the poem referred to were published in *Morning Light* for May 10, 1902.

As keeper of the archives I have to report a number of miscellaneous papers on hand of interest in the history of our movement as an Association, but no manuscripts of Swedenborg or copies of the same, and I have therefore not rented a fire-proof box.

The fragment, "A Characteristic and Philosophical Doctrine of Universals" promised to the Association (minute 322) was subsequently published in "The New Philosophy."

EUGENE J. E. SCHRECK,
*Secretary.*

## REPORT OF THE TREASURER.

*To the Members of the Swedenborg Scientific Association.*

THE report of the Treasurer of the Swedenborg Scientific Association is herewith submitted to you, and it may perhaps not be amiss to make a few comparisons with last year's report.

*Nine additional members joined the Association in the course of the annual meeting at which this report was read.—SECRETARY.

The membership fees for the year ending May 31, 1903, have amounted to $10.00 more than last year. Only one person joined the Association as a life member, paying the life membership fee of $25.00; so if this $25.00 were deducted the fees would amount to only $157.00, or $15.00 less than the previous year.

The receipts for the *New Philosophy* are about the same as last year, although we have added fifty-six new subscribers since the last report, but against this twenty-three persons have been discontinued, some at their own request, and some for the reason that they failed to pay their subscriptions, giving no attention to continued appeals for remittances. The number of subscribers to date is 268.

On figuring up the unpaid membership dues and subscriptions to *New Philosophy,* we find there is $118.50 due the Association from this source. The former Treasurer, Mr. Asplundh, issued several appeals to members in arrears to remit, informing them that if they did not do so, he would be obliged to drop them from the roll of members, as the By-Laws of the Association provide that if a member does not pay his dues for two years, and after having been duly notified, he shall be considered to have resigned from the Association. Very little attention, however, was paid to these notices, and in consequence a unmber of persons have been dropped from the roll of members. A total of twenty-one persons (see report) have either resigned or been dropped, leaving a net total of 184 members.

It will be noticed that there is a balance on hand this year of $179.73 against $146.00 last year. $95.88 of this amount, however, belongs to the Scientific MSS. and *Worship and Love of God* publication funds, leaving a balance in the general fund of $83.85.

It is to be hoped that all those still in arrears will kindly remit as soon as possible, as it involves a great deal of clerical work to be continually obliged to send out statements and requests for dues and subscriptions.

All of which is respectfully submitted,

C. E. DŒRING,
*Treasurer.*

BRYN ATHYN, PA., June 22, 1903.

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## FINANCIAL STATEMENT. MAY 31, 1903.

### RECEIPTS.

| | | |
|---|---|---|
| Balance on hand as per last Report,..... | | $1 46 |
| Membership Fees, ..... | $182 00 | |
| Subscriptions to *New Philosophy*,..... | 156 30 | |
| Special Contributions,..... | 38 71 | |
| | | $377 01 |
| | | $378 47 |

EXPENDITURES.

*New Philosophy.*

| | | |
|---|---|---|
| Printing July and October, 1902, and January and April, 1903, issues, | $208 58 | |
| Five Reams of Paper, | 15 00 | |
| Envelopes for Mailing N. P., | 4 07 | |
| Freight, Telegrams, Commissions, | 1 48 | |
| Rental of Mailing List, | 4 00 | |
| | | $233 13 |

*General:—*

| | | |
|---|---|---|
| Postage, | $15 99 | |
| Stationery, | 7 00 | |
| Cards for Subscription Ledger, | 1 20 | |
| Rubber Stamps, | 1.30 | |
| | | 25 49 |
| Clerical Assistance, | | 36 00 |
| | | $294 62 |
| Balance, | | $83 85 |

*Scientific MSS. Account:—*

RECEIPTS.

| | | |
|---|---|---|
| Academy of the New Church, Balance of Appropriation, | $153 20 | |
| General Convention in U. S., Appropriation, | 300 00 | |
| | | $453 20 |

EXPENDITURES.

| | |
|---|---|
| As per Report, | 370 42 |
| Balance, | $82 78 |

*Worship and Love of God Account:—*

RECEIPTS.

| | |
|---|---|
| From Subscribers | $18 50 |

EXPENDITURES.

| | |
|---|---|
| Two Copies, old Edition of W. L. G. for the use of the Translator | 1 17 |

| | | |
|---|---|---|
| Typewriting MSS. for Printer, | 4 23 | |
| | | $5 40 |
| Balance, | | $13 10 |
| Net Balance, | | $179 73 |

Audited and found correct.

JNO. A. WELLS,
GEO. M. COOPER,
*Auditors.*

Bryn Athyn, July 21, 1903.

## REPORT OF THE EDITOR OF "THE NEW PHILOSOPHY."

ALL four numbers of "The New Philosophy" for the past year, except the first,—which could not be curtailed without leaving out some reports connected with the last meeting of the Association,—have been held down to the minimum number of pages, 32. The editor regrets that delays have occurred in the issuance of the magazine, but considers that this is not a serious matter in a quarterly. It has been the editor's policy to publish translations of Swedenborg's MSS. in preference to collateral material, and thanks to the valuable contributions of Mr. Stroh he has been enabled to carry this policy out quite thoroughly. Besides installments of Prof. Price's translation of the work on the "Senses," translations of Swedenborg's early paper on the "Causes of Things," "The Characteristic and Mathematical Philosophy of Universals," and portions of his "Summary of the Principia" have been printed. For notes, reviews, etc., the editor is particularly indebted to the President of the Association, to Mr. Hite and to Mr. Stroh.

But in spite of the service performed by the magazine in acting as a medium for the publication of Swedenborg's MSS., and in spite of the interest attaching to many other contributions, the editor gives it as his opinion that the present system under which it is carried on involves an unnecessary waste of the Association's funds and does not produce the results that ought to be attained by it.

The difficulty with "The New Philosophy" is, I think, shared by the Association, and is one that the latter placed itself under when it adopted the second of its two declared purposes, "The promotion of the principles taught in these works, having in view likewise their relation to the science and philosophy of the present day." It is the editor's opinion that the strength of our Association would be materially increased could this be entirely done away with or at least radically modified.

The scientific and philosophical works of Swedenborg interest men for very different reasons. Some hold that almost everything in those works, as in the later writings, is absolutely true, while to others they are simply historical curios, or of interest only for the comparative light they shed on Swedenborg's later career and later philosophy. Between these extremes are all shades of opinion. There is one point, however, upon which all who in any way support the Association are practically agreed, and this is on the desirability of having Swedenborg's early writings preserved, published and translated. This consensus of opinion is well expressed in the first article of purposes: "The preservation, translation, publication and distribution of the scientific and philosophical writings of Emanuel Swedenborg." On the second point, however, there is widespread disagreement, and this very point has, in my opinion, held us back incalculably. All interested in the publication of the works do not believe in the truth of the principles contained, others do not believe in all the principles contained, and many do not consider that we yet know enough to express an opinion as to whether we should or should not "promulgate" them. I doubt myself very much whether "principles taught in those works" is a proper expression regarding Swedenborg's earlier statements.

It was owing, I believe, to a desire to carry on this "promulgation" that "The New Philosophy" was adopted as an organ. And here our troubles begin again. There being so little agreement among the members of the organization how Swedenborg's earlier principles should be regarded, it is not to be wondered at that a definite policy for "The New Philosophy" is hard to outline and harder to follow, and that no very great number is likely to be satisfied in any case.

Another reason for changing the nature of our magazine is one of practical economy. We are now undertaking two financial burdens: (1) The publication of Swedenborg's early writings, and (2) the support of a magazine. Now in the opinion of your editor these can be largely combined.

On examining the material in "The New Philosophy," it will be readily seen that much which is placed under the headings "Note and Comment," "Reviews," etc., might well appear in some strictly New Church publication, and in some cases, as, for instance, in the matter of communications relative to interest in Swedenborg's works in Sweden, it has actually so appeared. The rest of the number is usually filled with translations of Swedenborg's own writings, which in itself constitutes one of the main objects of the Association.

The principal changes I would inaugurate are the following:

Leaving New Church periodicals to handle all the first class of matter, I would turn the magazine into a quarterly bulletin, each number to contain a section of some one of Swedenborg's works so printed that all may afterwards be brought together and bound in one or more volumes. One bulletin might be set aside for the transaction of our annual meeting, or those transactions might be appended to it. I know

very well that some of our translators find great difficulty in furnishing us with even a small number of pages at a time, but is it not possible that with our funds unencumbered by the double work above referred to, we might relieve them sufficiently to procure the amount of material we require?

We might guarantee our subscribers a certain number of pages during the year, but issue still more if our funds permitted, either by increasing the size of our numbers or by issuing more numbers.

The following is the exact programme I have to offer:

(1) Let the next two numbers of "The New Philosophy" appear as usual to complete Vol. VI., but let the last contain an announcement of the changes contemplated. If the Swedenborg Scientific Association would authorize me to increase this last number to 48 pp., I could publish in that all the remainder of Mr. Stroh's translation of the "Summary of the Principia" so as to close that article.

(2) Beginning January 1, 1904, I would change the title of the magazine to "The Bulletin of the Swedenborg Scientific Association," or to one equally suitable. At the same time I would turn over control of the covers of the Bulletin to the gentleman who is now business manager, since advertisements and new announcements can be made by him at the same time just as well. After the first alterations are made he will find very little extra trouble falling upon him.

(3) I would devote all future numbers, until it is completed, to a continuation of the work on the "Senses," and in order to carry this through would advise that the Association furnish enough assistance to the present translator to enable him to devote more time to it, or to procure an assistant translator.

(4) I would inaugurate a sort of "pay as you go," or rather "publish as you can afford it" policy, adapting the number of pages translated and published during the year, outside of certain limits, to the Association's income.

(5) I would have a sufficient number of copies struck off to make a first edition of respectable size.

(6) Provision must be made to have those parts of the work on the "Senses" already published republished together so as to be bound in with the rest. This can be done in one or two extra numbers.

(7) If it is the opinion of the Association that measures can be taken to keep a translator on this work long enough during the year to furnish 128 printed pages, the present editor agrees to engineer through these changes, and, if necessary, to keep an eye on the Bulletin during the coming year, unless called away on some distant duty.

(8) Although only directly concerned with this report, the editor strongly recommend the omission, or, at all events, radical alteration of the second expresed object of the Association. He would also reduce the Association meetings within narrower bounds, confining its work almost entirely to reports of progress, plans for future work and the discussion of ways and means of publishing the works we have yet to

bring out. A consideration of the second expressed purpose of the Association he believes can and should wait until the first is more nearly fulfilled. This point he adds merely to indicate his opinion on the matter and to bring it before the Association.

If it is desired to continue the magazine as heretofore, the present editor does not feel that he can give the time to the work which it ought to receive, and resigns his duties into your hands.

With best wishes for the success of your meetings, respectfully submitted,

JOHN R. SWANTON.

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## REPORT OF THE COMMITTEE ON EDITING THE NEW EDITION OF THE "PRINCIPIA."

THE report of this Committee at the last annual meeting showed that the notes and corrections made by the American members of the Committee, Messrs. Mann, Price and Sewall, on the entire work in the former edition, had been sent to the English members, Messrs. Tansley and Rendell, and that they were progressing in their own revision, availing themselves as far as they could of the notes sent by our members. The following letter from Mr. Tansley shows the progress made and also raises the question as to the advisability of adopting the Clissold text in the main as heretofore proposed, or of discarding it entirely and setting out with a new translation altogether. The revision of the mathematical part of the work will require much careful labor, and under these circumstances it would appear that the new edition of this important work can hardly be looked for at a very early date. It is important that the work be done thoroughly if at all, and the possibility of the text of the Lesser Principia being made available for publication and translation at a day not very distant, suggests the inquiry whether it would be well to delay the issuing of the new edition of the Principia until the earlier work can be issued at the same time, and possibly in connection with the later, thus presenting the whole system of our author in one publication.

Meanwhile the work of revision will go on and the effort continue to present this great work in a suitable form at as early date as is practicable.

FRANK SEWALL,
*Chairman of the Committee.*

July 1, 1903.

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### LETTER FROM THE ENGLISH COMMITTEE.

Mr. Rendell and myself have every desire to co-operate with the American editors, and we have accordingly made use of the valuable material which you sent to us. I write, however, to say that we do not

consider that we are limited to the notes forwarded to us in the important work in which we are engaged. We have very carefully examined Mr. Clissold's translation, and have come to the conclusion that it will have to be much altered in order to bring the language up to modern requirements. There is also very much detailed work required in connection with the mathematical calculations and other matters which will require very careful attention. All this means expenditure of time, and Mr. Rendell and myself are both busy men and cannot give continuous attention to this duty. We, however, intend to proceed as quickly as possible. As the work is to be printed here, and the Swedenborg Society to be responsible for the publication, as I presume is the case, it will be more convenient and more expeditious to send proofs than to send large masses of notes to be sent back again to us, etc. I believe you will be satisfied with the arrangement when it is put into force. There are many other points which will involve correspondence in the future, and which I shall endeavor to attend to as the requirement arises.

I am, sincerely yours,

ISAIAH TANSLEY.

London, May 18, 1903.

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## REPORT OF THE COMMITTEE ON A NEW EDITION OF THE "ANIMAL KINGDOM."

REV. FRANK SEWALL, PRESIDENT SWEDENBORG SCIENTIFIC ASSOCIATION.

*Dear Sir:—*

The Committee on the new edition of the *Animal Kingdom* beg leave to report that owing to press of other duties very little work has been done on the revision during the past year.

Yours respectfully,

C. E. DŒRING,
*Chairman.*

June 25, 1903.

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## REPORT OF THE COMMITTEE ON THE "LESSER PRINCIPIA."

BOARD OF DIRECTORS, SWEDENBORG SCIENTIFIC ASSOCIATION.

*Gentlemen:—*

Since my last report, I have received from Rev. R. W. Brown that portion of the Latin transcript of the *Lesser Principia* which was prepared by him, so that I now have in my hands the transcription of the entire work.

At the end of January I associated with me as a member of the Committee the Rev. C. E. Dœring. Since then Mr. Dœring and I have met

together every week, and the work of translation is going steadily forward.

Yours truly,
ALFRED ACTON,
*Chairman.*

June 26, 1903.

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## REPORT OF THE COMMITTEE ON THE TRANSLATION OF THE "SENSES."

REV. E. J. E. SCHRECK, SECRETARY.

*My Dear Sir:—*

In regard to the translation of the fourth part of *Regnum Animale*, known as *De Sensibus*, I would say that the translation goes slowly on, but as at last report must say that the chairman of the Committee is too busy a man to get on with the work very rapidly. I have now reached according to the original numbering number 5 of Chapter V., *De Aure, et Sensus Auditus*, according to my numbering, paragraph 105 of the whole work.

Yours sincerely,
ENOCH S. PRICE.

May 26, 1903.

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## REPORT OF THE COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MANUSCRIPTS.

THE BOARD OF DIRECTORS, SWEDENBORG SCIENTIFIC ASSOCIATION.

*Gentlemen:—*

The Committee on the Publication of Swedenborg's Scientific MSS. beg leave to report as follows:

Up to the time of our last report only one copyist had been engaged in Stockholm, but in August, 1902, Mr. Alfred H. Stroh, who was then in Sweden, was appointed by the Committee to take charge of the work there. Mr. Stroh succeeded in finding additional copyists, and under his superintendence the work of copying has gone rapidly forward. He has also paid particular attention to the collating of copy with the original MSS. in order to secure the greatest possible accuracy, and the Committee wishes to take this opportunity of giving public expression of its appreciation of his services.

Following is a list of the Codices that have been copied:

Codex 36, Excerpts from Aristotle.
Codex 37, Index Variorum Philosophicorum
Codex 81, De Magnete.
Codex 82, De Sulphure et Pyrite.
Codex 83, De Sale Communi.

Codex 84, De Secretione Argenti et Cupri.
Codex 85, De Vitriolo deque modis vitriolum elixandi, etc.
Codex 86, Geometrica et Algebraica.
Codex 88, Varia Philosophica Anatomica et Itineraria.
Codex 99, Description of Swedish Iron Furnaces.

Only those portions of Codices 86 and 88 have been copied that have not already been phototyped or printed.

So far as is ascertained this completes the copying of all of Swedenborg's unpublished scientific MSS., not counting those that will be published by the committee recently appointed by the Academy of Sciences of Stockholm.

We estimate that the above Codices fill about 2,000 pages of copy, size 8 by 13 inches. Of these about 600 pages are now in the hands of your Committee, and the balance will be brought along by Mr. Stroh when he returns from Stockholm in the fall.

The Committee has commenced the work of printing, and about one-quarter of the MSS. "De Sale Communi" has already been put in type. This work will be pushed forward as rapidly as possible so far as the funds in the hands of the Committee will permit.

The Rev. C. E. Dœring has been added to the Committee to fill the vacancy caused by the death of Mr. Carl Hj. Asplundh, on February 12, 1903. We cannot pass by this mention of Mr. Asplundh without paying tribute to his memory. He was the originator of the movement which led to our Association undertaking the work of copying the Scientific Manuscripts of Swedenborg, and it is largely owing to his untiring energy and zeal that the actual work was successfully organized and carried on.

We append to this report a statement of the receipts and expenditures of your Committee, which shows that there is only a small balance of $82.78 left of the $600.00 appropriated by the General Convention and the Academy of the New Church. This amount is not sufficient to cover the expense of printing the remaining part of the MS. on Salt, the Swedenborg Society of London having declined to co-operate in the work by subscribing to one-half of the printed copies as originally contemplated.

A special effort will therefore have to be made to collect more funds in order that the work of printing may be continued and completed as at first proposed. As soon as the present small balance is exhausted the work of your Committee will be at a standstill on account of the lack of funds.

All of which is respectfully submitted,

FRANK SEWALL, *Chairman;*
C. E. DŒRING,
ALFRED ACTON, *Secretary.*

June 26, 1903.

## REPORT OF RECEIPTS AND EXPENDITURES, COMMITTEE ON THE PUBLICATION OF SWEDENBORG'S SCIENTIFIC MSS., MAY 31, 1903.

### RECEIPTS.

| | | |
|---|---|---|
| Academy of the New Church, Appropriation,..... | $300 00 | |
| General Convention in U. S., Appropriation,..... | 300 00 | |
| | | $600 00 |

### EXPENDITURES.

| | | | |
|---|---|---|---|
| Previously reported, ..... | | $146 80 | |
| Print 16 pages De Sale,..... | | 32 05 | |
| Engraving two Cuts, De Sale,..... | | 2 75 | |
| Freight and Duty on illustrations for De Sale from Sweden, ..... | | 7 46 | |
| Expended by A. H. Stroh, Stockholm: | | | |
| | Kronor. | | |
| Postage, paper, mucilage, etc.,..... | 37 52 | 10 13 | |
| Janitor expenses, opening doors at Library, | 71 00 | 19 19 | |
| J. E. Boyesen, acct. Services,..... | 62 50 | 16 87 | |
| Illustrations De Sale,..... | 69 90 | 18 87 | |
| On acct. of Copying Codices,..... | 974 50 | 263 10 | |
| | Kr. 1215 42 | | $517 22 |
| Balance, ..... | | | $82 78 |

## RECAPITULATION.

### RECEIPTS.

| | | |
|---|---|---|
| Balance on hand as per last Report,..... | $1 46 | |
| General Receipts, ..... | 377 01 | |
| Scientific MSS. Account..... | 453 20 | |
| Worship and Love of God Account,..... | 18 50 | |
| | | $850 17 |

### EXPENDITURES.

| | | |
|---|---|---|
| *New Philosophy,* ..... | $233 13 | |
| Scientific MSS. Account..... | 370.42 | |
| Worship and Love of God Account,..... | 5.40 | |
| General Expense, ..... | 61 49 | |
| | | $670 44 |
| Net Balance, ..... | | $179 73 |

## MR. STROH'S WORK.

Rev. E. J. E. Schreck, Secretary of the Swedenborg Scientific Association:—

In a communication to the last meeting of the Association I recorded the transcription of a number of Swedenborg's unprinted manuscripts. During the meeting the manuscripts were offered to the Association and the arrangement made that they be transferred to the Association after there had been opportunity to revise them. Since the last meeting I have had opportunity to revise the transcriptions by comparing them with the original manuscripts preserved in the Library of the Royal Swedish Academy of Sciences, and it has been my intention to transmit them to the keeper of the Association's archives. But the Academy of Sciences has recently become much interested in the matter of printing a selected number of Swedenborg's manuscripts and works out of print, to be issued in a series with some such general title as *Emanuelis Swedenborgii Opera Quædam Obsoleta et partim Inedita.* In view of this I would ask the permission of the Association to retain the transcriptions in my possession somewhat longer in order that the Swedenborg Committee of the Academy of Sciences may have the use of them, for the question of printing one of them has arisen.

I take this opportunity of offering to the Association the transcription of Swedenborg's paper, *De Causis Rerum,* which was made directly from the original manuscript preserved in the Diocesan Library at Linkoping. This paper was translated into English and appeared in "The New Philosophy" for January, together with the first installment of an English translation of one of the manuscripts, the transcription of which was reported last year, namely, the "Summary of the Principia."

Having been appointed by the Executive Committee of the Association to edit and see through the press the edition of the *"Worship and Love of God,"* the publication of which was proposed and undertaken by the Association, I have been occupied with it during the past year. A revision of the First and Second Parts has been made by me, and hundreds of changes entered in the old translation. The Third Part has also been translated, and Swedenborg's marginal notes entered in their proper places in the First Part. Progress has been made and printing begun. I wish to record my indebtedness to Dr. Frank Sewall for his valuable improvements in the final revision of the First Part, especially in the direction of enhancing the beauty and gracefulness of the English; to the Rev. George G. Starkey and the Rev. William B. Caldwell for suggested improvements in the early portion of the First Part, and to Mr. James Speirs, of London, for the use of his copy of the original Latin edition of the First and Second Parts, containing a transcription of Swedenborg's marginal notes to the First Part, entered

with much care by the former librarian of the Royal Swedish Academy of Sciences, Dr. J. A. Ahlstrand.

Much progress has been made in the copying for the Association of certain of the unphotographed scientific manuscripts of Swedenborg, which are preserved in the Library of the Academy of Sciences at Stockholm. Shortly after my arrival in Stockholm the copy of Codex 83, which had been collated and sent to America, was returned for further collation. Inclusive of the copy and of those mentioned in the Report of Committee on the Publication of Swedenborg's Scientific Manuscripts to the last meeting of the Association as having been completed, the following codices or parts of codices have been copied under my superintendence from the original manuscripts, namely, Codices 36, 37, 81, 82, 83, 84, 85, 86, 88 and 99. Most of this copy has also been collated, and some time ago the collated copies of codices 82, 83 and 84 were mailed to the former Treasurer of the Association, Mr. C. Hj. Asplundh, under whose general management the work which I am superintending was begun and nearly completed before his sudden death. Since then I have been corresponding in regard to the work with his successor, the Rev. C. E. Dœring.

In this connection a few words may be said in regard to the copying which is being carried on for the use of the Swedenborg Committee of the Royal Swedish Academy of Sciences. A large number of the manuscripts of Swedenborg which are contained in the volume of *Collectanea Physico-Mathematica, XL Bibliothecæ Lincopiensis* have been copied; the copying of Swedenborg's indices to the Second Part of the *Œconomia Regni Animalis* and to the First and Second Parts of the *Regnum Animale,* which are contained in Codex 38, has been completed, as also Codex 57, and much headway has also been made in the copying of Codex 65.

The action of the Academy of Sciences, in appointing a special committee to investigate the scientific works of Swedenborg and the decision to print a series of manuscripts and works out of print, referred to above, have been reported to *The New Philosophy.* (See the issue for April.) It may now be added that in additiion to the "Lesser Principia" it has now been decided to begin at once with the printing of another volume of the series which is planned to contain Swedengorg's contributions to geology together with the "Miscellaneous Observations" and "Principles of Chemistry." The copy for both volumes is in the hands of the printer, and I have lately been busy preparing it and afterward correcting the proof sheets.

For more than half a year I have been at work on a "Memoir respecting Emanuel Swedenborg as a Scientist and Natural Philosopher," which will be submitted to the consideration of the Royal Swedish Academy of Sciences. I have also planned and begun the elaboration of a "*General Index to Swedenborg's Scientific Works,*" with something of the scope of Beyer's *Index Initialis,* a work which is still of value to

the student, and would be still more so if revised and brought up to date. For years I have felt the need of an index to Swedenborg's scientific works, especially when making a comparative study of any one subject as treated by him in various places and at various times. I now propose to make use of the indices which Swedenborg himself made and by further indexing the most important and striking passages in the scientific works to produce a guide for the student which will be in relation to the scientific works as a whole what the brain and nerves are to the body. Any suggestions from anyone interested in the work will be most gladly received.

Respectfully submitted,

ALFRED H. STROH.

77 Radmansgatan, Stockholm, June 1, 1903.

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## COMMUNICATIONS.

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## GREETING FROM THE PITTSBURG PHILOSOPHY CLUB.

THE New Church Philosophy Club, of Pittsburg, sends greeting to the Swedenborg Scientific Association on the occasion of its annual meeting, and takes this opportunity to express its appreciation and interest in the work being carried on by the Association.

Pittsburg, Pa., June 8, 1903.

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## COMMUNICATION FROM THE SWEDENBORG PHILOSOPHY CLUB, OF CHICAGO.

ACTIVE interest in Swedenborg's science and philosophy has recently been revived in Chicago by the formation of a new club, the Swedenborg Philosophy Club, of Chicago, to succeed the defunct organization which existed formerly.

The first meeting was held on April 25, 1903, with ten members present. Since that date two meetings have been held, one on May 4th. the other on June 2d.

The club has taken up for systematic study Swedenborg's *Economy of the Animal Kingdom,* a portion of the work being read and discussed at each meeting. At the last meeting some studies with the microscope were attempted, and these met with such hearty approval that similar work will doubtless be done in the future.

To the Swedenborg Scientific Association the club sends heartiest

greetings. It desires to co-operate in every way with the work of the Association. May the coming year be a prosperous and useful one.

Respectfully submitted,

E. A. FARRINGTON,
*Secretary.*

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## CONSTITUTION.

### ARTICLE I—NAME.

This organization shall be called the Swedenborg Scientific Association.

### ARTICLE II—OBJECTS.

The objects of this Association shall be:

1. To preserve, translate, publish, and distribute the scientific and philosophical works of Emanuel Swedenborg.

2. To promote the principles taught in these works, having in view likewise their relation to the science and philosophy of the present day.

### ARTICLE III—MEMBERSHIP.

Any person desiring to co-operate in promoting the objects of this Association may become a member by written application to the Secretary and by the payment of an anual fee of one dollar; or, he may become a life member by the payment of the sum of twenty-five dollars.

### ARTICLE IV—OFFICERS.

The officers of this body shall be a President, a Secretary, a Treasurer, and a Board of Directors, consisting of these officers and nine additional members, all to be elected by ballot at the annual meeting of the body. It shall be the duty of the Board of Directors to devise ways and means to carry out the objects of the Association.

### ARTICLE V—MEETINGS.

This Association shall meet annually at such time and place as the Board of Directors shall determine. The Board of Directors shall have power to call special meetings as may be required.

### ARTICLE VI—AMENDMENTS.

Any article of the Constitution of this Association may be changed on the recommendation of the Board of Directors at any annual meeting by a two-thirds vote of the members present.

## BY-LAWS.

1. Five members of the Board of Directors and a majority of the members of any Committee of this Association shall constitute a *quorum* thereof, respectively.

2. The Board of Directors and all Committees of this Association *may act* either at a meeting at which a quorum is present, or without meeting, by correspondence between the members, but in the latter case no decision shall be arrived at without the acquiescence of a majority of the members of the Board of Directors, or Committee, as the case may be, communicated in writing to the Chairman of such Board or Committee.

3. The *annual dues* of each member shall become payable on the first day of the month following his reception as a member and annually thereafter. [A resolution adopted at the Third Annual Meeting (minute 160) provides that after having failed to pay his dues for two years, and after having been duly notified, a member shall be considered to have *resigned* from the Association.]

4. These By-Laws or any of them may be *amended* at any time by a majority vote of the Board of Directors.

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## LIST OF MEMBERS CORRECTED TO JULY 2, 1903.

Acton, Rev. Prof. Alfred, Bryn Athyn, Pa.
Akerman, William, Widerange, Kansas.
Alger, Wm. R., 6 Brimmer St., Boston, Mass.

Bailey, E. T., 39 High St., Fitchburg, Mass.
Barger, Gerrit, Voorburg, The Hague, Holland.
Barron, Clarence W., Cohasset, Mass.
Barton, Miss Mary L., 947 T St., Washington, D. C.
Barwell, J. W., Waukegan, Ill.
Bauman, Stacy, Faunce, Clearfield Co., Pa.
Beekman, Miss Lillian, Bryn Athyn, Pa.
Bennett, J. H., Terang, Victoria, Australia.
Bigelow, John, 21 Gramercy Park, New York.
Biggs, M. J., Oreana, Okla. Terr.
Boericke, Dr. F. A., 1011 Arch St., Philadelphia.
Boericke, Dr. William, 1812 Washington St., San Francisco, Cal.
Boggess, Dr. W. B., 4953 Centre Ave., Pittsburg, Pa.
Bowers, Rev. J. E., 37 Lowther Ave., Toronto, Canada.
Brickman, Rev. W. E., Bryn Athyn, Pa.
Brown, Edmond Congar, 132 Nassau St., New York.
Brown, Rev. R. W., Mid. Div. Hall, Univer. Chicago, Chicago, Ill.
Browne, Chas. F., 1020 Fine Arts Bldg., Chicago, Ill.

Bull, Mrs. M. H., 1550 Maine St., Quincy, Ill.
Burnham, Arthur W., 6943 Eggleston Ave., Chicago, Ill.
Burnham, Hugh L., Glenview, Ill.

Cabell, Rev. Philip B., Wilmington, Del.
Calbeck, John, Ligonier, Ind.
Caldwell, Robert B., Sr., 46 Leopold St., Toronto, Can.
Caldwell, Robert B., Jr., 1924 Frick Bldg., Pittsburg, Pa.
Caldwell, Rev. Wm. B., 750 Warren Ave., Chicago, Ill.
Carnes, Mrs. E. F., 1817 Polk Ave., Houston, Texas.
Carpenter, Paul, 518 Monadnock Block, Chicago, Ill.
Carriere, Rev. Chas. L., 2128 St. Louis St., St. Louis, Mo.
Carswell, Robert, 1534 King St., Toronto, Can.
Champion, Chas. T., 6229 Kumbark Ave., Chicago, Ill.
Chandler, Horace P., 53 Devonshire St., Boston, Mass.
Chase, Mrs. George, 309 West 74th St., New York City.
Child, Rev. Thos., 4 Old Oak Rd., Uxbridge Rd., W., London, Eng.
Childs, Walter C., 18 Overlook Terrace, Yonkers, N. Y.
Cline, Samuel, Crossville, Tenn.
Cockerel, Mrs. D'Arcy, Chelmsford, Berea, Durban, Natal, S. A.
Cole, Louis S., 681 North Ridgeway Ave., Chicago, Ill.
Cook, E. W., 59 Mitchell Bldg., Milwaukee, Wis.
Cook, George Earle, Oakdale, Montgomery Co., Md.
Cooper, Dr. Geo. M., Bryn Athyn, Pa.
Cornell, Mrs. A. F., 1757 First St., San Diego, Cal.
Cowley, Dr. Wm., 6015 Centre Ave., Pittsburg, Pa.
Cox, M. H. P., Kirkham, Md.
Craig, Chas. E., 3115 Fifth St., San Diego, Cal.
Cranch, Dr. Edward, 109 W. 9th St., Erie, Pa.
Cranch, Walter A., Bryn Athyn, Pa.
Crane, Thomas S., 24 Reynolds Terrace, Orange, N. J.
Cronlund, Rev. Emil R., 29 Elm Grove Ave., Toronto, Canada.
Cunningham, W. M., 174 North 4th St., Newark, Ohio.
Cutting, Chas. F., Newtonville, Mass.
Czerny, Rev. Andrew, 99 Holland Rd., Stockwell, London, Eng.

Daboll, John, Waltham, Mass.
David, Rev. J. S., Elmwood, Mass.
Davis, Roy S., Middleport, Ohio.
Dickson, W. K. L., Hotel Cecil, London, Eng.
Dœring, Rev. C. E., Bryn Athyn, Pa.
Duncan, Charles, 1631 S. Broad St., Philadelphia.
Dwight, Miss M. Grace, 41 Seymour St., Hartford, Conn.

Ebert, Charles H., 518 Frick Building, Pittsburg, Pa.
Evans, D. E., Kingston, Pa.
Farrington, Dr. E. A., 1400 N. Spaulding Ave., Chicago, Ill.
Farrington, Dr. Harvey, Glenview, Ill.

Ferrett, E., 58 Booraem Ave., Jersey City, N. J.
Flintcroft, Dr. W., Paterson, N. J.
Ford, L. P., Burton Tower, Cresford, North Wales.
French, Prof. Thos., Jr., Amherst, Mass.
Fuller, Miss Louisa M., 852 E. State St., Jacksonville, Ill.

Geiger, J. J., Steinway Hall, Chicago, Ill.
German, E. S., Harrisburg, Pa.
Gilmore, E. A., 76 Huntingdon Ave., Boston, Mass.
Gladish, Rev. W. L., Bryn Athyn, Pa.
Glenn, Gerald S., Bryn Athyn, Pa.
Glenn, Mrs. R. M., Bryn Athyn, Pa.
Goddard, John, Newtonville, Mass.
Gould, Dr. P. A., Gibsonville, O.
Grant, Chas., Gerber, N. D.
Gray, W. N., Stoneham, Mass.
Gross, Philip, 126 Grand St., Milwaukee, Wis.
Gunther, Emil P., 2579 W. Fayette St., Baltimore, Md.
Gyllenhaal, Leonard, Glenview, Ill.

Hanlin, Dr. S. B., Pomeroy, Ohio.
Hanlin, Dr. W. A., Middleport, Ohio.
Hanson, Peter, Long Beach, Paufu Co., Wash.
Harris, Arthur E., Mercer, Maine.
Harris, John, Box 31, Canal Dover.
Hay, Rev. H. C., 15 A, Beacon St., Boston, Mass.
Headsten, John, 248 Jansen Ave., Chicago, Ill.
Hicks, S. H., Bryn Athyn, Pa.
Higgins, Rev. F. L., Toronto, Canada, 450 Spadina Ave.
Hite, Rev. L. F., 1 Avon Pl., North Cambridge, Mass.
Hobart, Mis Carrie, Bryn Athyn, Pa.
Hogan, Miss M., Bryn Athyn, Pa.
Houghton, H. S., Winchester, Mass.
Hunt, Miss Ida W., 717 Irving St., N. W., Washington, D. C.

Janicke, William, Leona, Kan.

Keep, Rev. R. H., 288 Gordon St., Atlanta, Ga.
Keith, Dr. Fred. S., 10 Hartford St., Newton Highlands, Mass.
Kendig, Jos. R., Renovo, Pa.
Kent, Dr. J. T., Evansville, Ill.
Klein, Rev. D. H., Glenview, Ill.
Knudsen, K., 2202 Ridge Ave., Philadelphia.
Kruka, R., Amboy, Washington.
Landenberger, Rev. L. G., 3471 Windsor Pl., St. Louis, Mo.
Layton, F. Sherman, 6922 Stewart Ave., Chicago, Ill.
Leopold, Calvin M., Nazareth, Pa.

Lechner, Miss Elsa C., 235 Diethridge St., Pittsburg, Pa.
Lechner, Herman, Room 3, Empire Theatre Bldg., New York City.

Macbeth, Geo. A., 717 Amberson Ave., Pittsburg, Pa.
Mackenzie, John, P. O. Box 584, Spokane, Wash.
Manby, C. J. N., 10 Engelbrektsgatan, Stockholm, Sweden.
Mann, Rev. C. H., Orange, N. J.
Mayhew, Rev. W. H., Yarmouthport, Mass.
Maynard, Arthur T., Glenview, Ill.
McLaughlin, S., 450 E. 10th St., Los Angeles, Cal.
Meday, C. H., 543 Cass Ave., Detroit, Mich.
Mercer, Rev. L. P., 4th and John Sts., Cincinnati, Ohio.
Metcalf, J. T., Cornwall, Conn.
Metcalf, Dr. Wm. H., 119 College St., New Haven, Conn.

Nash, Geo. W., Bronxwood Park, Williamsbridge, New York, N. Y.
Neuberger, Dr. Max., VI Kollergerngasse 3, Vienna, Austria.
Nicholson, E., 2415 Detroit St., Cleveland, Ohio.
Niles, Wm., La Porte, Ind.
Norris, Mark, 1003 Mich. Trust Bldg., Grand Rapids, Mich.
Nussbaum, Rev. Chas. A., 1911 North 12th St., St. Louis, Mo.
Nye, Chas. M., De Witt, Iowa.

Owen, Mr. George H., 6035 Drexel Ave., Chicago, Ill.

Parker, Edgar, 502 S. 44th St., Philadelphia, Pa.
Patch, Frank W., Framingham, Mass.
Peck, Mrs. S. E., 198 Summer St., Newark, N. J.
Pendleton, Miss Venita, Pittsburg, Pa.
Pendleton, Rev. W. F., Bryn Athyn, Pa.
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(Minutes 248, 290.)

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(Reference, minute 388; report of Board of Directors, sections 6, 10, 11.)

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(Minutes 288, 345-347; B. D., 156, 159; New Phil., July, 1901, p. 85.)

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## INDEX TO THE NEW PHILOSOPHY.

In response to many requests for an index to the NEW PHILOSOPHY, an excellent index to Vols. I.-V. was prepared several months ago by Mr. E. F. Stroh, and forwarded to the editor. But in view of changes likely to be introduced under the new management, which enters upon its work next January, it has seemed advisable to wait until the end of the current year, and extend the index so as to cover Vol. VI. as well. This will enable the new editor to enter upon the work *de novo* regardless, as far as may be, of all that has gone before. Having the contents of the October NEW PHILOSOPHY already in hand, the editor believes little delay, although some added expense, will be involved in printing an index at the same time.

JOHN R. SWANTON, *Editor.*

# THE NEW PHILOSOPHY.

VOL. VI. OCTOBER, 1903. No. 4.

## THE SENSES.

PART FOUR OF THE ANIMAL KINGDOM, BY EMANUEL SWEDENBORG.

### CHAPTER V.

THE EAR AND THE SENSE OF HEARING.

97. 1. *What pertains to hearing cannot be explored, unless we consider what sound is. The ear is only an organic or instrumental cause, while sound is the principle cause; nor can what sound is be examined, unless first what modification is be inquired into; for sound is a modification of the air which becomes sensation in the ear, whence is hearing; but what sonorous modification is cannot be investigated, unless we learn what air is; for thence or from its modulation sound springs forth; nor is it known what air is, unless its particle be known; for the particle of air is its smallest volume, or air in its smallest unity and simplicity; nor is it known what the particle of air is, unless the quality of the prior atmosphere be known from which it arises, or from which it derives its form and power, or from which it derives its existence and nature, wherefore its essence.* From these considerations it is apparent, 1, of how vast a science and knowledge is this unique sense. 2. That it cannot be fully exhausted, unless all things which are in the atmospheric world concur. 3. Knowledge, except from principles, is only common [proletaria] science, and as it were palliative,—only a science of the senses, not from causes, but the science of an animal, which enjoys no reason. 4. In order that we may explore causes it will be necessary for

us to ascend even to the infinite, and descend thence to effects, when first we shall be able to proceed to causes by the analytical way. 5. Thus we, rational men, are able to act as angels, among whom we can be when we shall have explored truths, and are in them; this is the way to heaven,—to the primeval state, perfection. 6. But a superior power will meet us, which must be consulted; this power leads us into truths,—the senses lead us only into fallacies. 7. Therefore for rightly knowing one thing all things are required; the whole must be known in order to know a part of the whole; for in every part lies hidden an idea of the whole. 8. Nor is it given to know what is in any part of sensation, of modification, etc., unless we arrive by doctrines, especially those of forms, of order and of degree, of influxes, and of correspondences.

98. 2. *We must begin here with the particles of the air, for thence will be evident what its volume is;* for, 1, the particle is the smallest volume of its own atmosphere. 2. As the particle acts, so the congregation of particles act. 3. An atmosphere derives its all from its parts,—its very nature, the form of its fluxion, etc. 4. Hence how necessary the corpuscular doctrine is, becomes evident. 5. We arrive at this doctrine from a knowledge of volume, for the phenomena of the whole are similar to those of the parts. 6. Besides we learn that another sphere of acting begins in the particle, for a particle is a small volume; it derives its nature from its own particles which compose it; that is, from its prior things; the prior sphere is therein, the superior, and more perfect. 7. All unity respects its own unities, and these again theirs, thus even to the beginnings of all things. 8. Wherefore to terminate the idea in a single part, and to declare this the most simple, is to make so many wholes, and steadfastly to terminate the ideas in an occult quality; to do this is by no means rational, since it is not consonant with nature. 9. The above things now must be excluded, for we are not admitted to causes by the phenomena of the air alone.

99. 3. *From the phenomena of modification the quality of the part or particle of that atmosphere appears,* 1, for the parts are what are modified. 2. Thence the whole volume is modified. 3. The volume derives from the parts, that it acts thus

and so. 4. Or it derives this from the nature of the parts, and the nature of the form, according as they act. 5. Nature acts according to its form; for substantial form corresponds exactly to the form of fluxion.

**100.** 4. *From many phenomena discovered in the air, it appears that its particle is of a perfectly sperical form, in such a way, however, that the endeavor of its prior parts is towards a spiral form.* 1. That it is spherical is evident from its fluxion. 2. From its equal pressure at every point, above, below and at the sides, it appears that it can be in no other form. 3. This is evident from its most easy yielding. 4. Especially is this apparent from its modification. 5. Also, by the spherical action in an object, as its action upon mercury, upon water without, and upon bubbles and vapors within. 6. A similar most equal action cannot result from the highest equality. 7. It is in the smallest volume as in the greatest. 8. That the air particles touch each other at every smallest point is evident from their yieldance.

**101.** *Air is compressible, expansible, in a word elastic.* 1. It appears from the experiments of Boyle that a very great volume of air can be forced into a very small volume. 2. So also it can be expanded. 3. If this can be done with the volume, then certainly it can be so done with the parts. 4. For there is no penetration of dimensions. 5. From somewhat hard particles no such thing exists; as in waters, mercuries and other liquids, which cannot be compressed and dilated. 6. This compressibility and expansibility air derives from itself from its prior and more perfect parts of which it consists, which unless they were thus far yielding, expansible and elastic, this composition could by no means be of such a nature as it is: thus further; 7, 8. The rule of elasticity is, that it may comunicate every impression with neighboring parts, in order that not anything of the impressed force may perish. 9. This holds good indeed for every distance. 10. Since this elasticity perishes in the air, and is measured by the distance to which it tends, it follows that it is gifted with some gravity, or some nature, which heavy and non-elastic bodies do not have. 11. Thus in order that it may absorb the impressed force; for what is truly elastic is neither heavy nor light. 12. From its weight, by in-

cumbency according to its column, from gravity itself, the volume of air is measured. 13. It is measured from resistance and reaction. 14. Whence it is evident that it is not the purest atmosphere, but the last; and that there are purer atmospheres, in a certain order and degree of simplicity, not alone of expansion.

102. *That it continually strives towards its original form,* 1, or that from a form in itself most perfect it conspires towards its own form, which, such components being given, cannot be another form. 2. That its essence is constant, while its modes are variable. 3. Its modes are its mutations of state. 4. Experience testifies the same thing, for it immediately relapses, and, 5, remains permanent in form and measure, according to the gravity of the accumbent parts.

103. *That it derives this nature by itself from prior things.* 1. For it is the smallest volume, albeit the unity of its own atmosphere. 2. The more perfect parts will be those which constitute it. 3. Nor can they be otherwise than according to the form in composition. 4. Infinite things lie hidden, very few lie open. 5. Our senses detect the ultimates, 6, as is evident from microscopes, 7, from the smallest resultant phenomena. 8. The common forces of those things make themselves public; if there be forces, they will be substances, if substances, they can be assimilated to the parts.

104. *Since the parts of the air are elastic, they are fully modifiable.* 1. Its elasticity is an attribute of its modifiability, 2, and of its extension into a tubule, 3, so that afterwards what happens in one extreme may appear in the other. 4. Thence is sound; 5, but it is not elasticity; wherefor neither is it pure modifiability.

105. 5. *If the particles of the air are vesicles, and of such form, it is not to be concluded that their modification is brought about by intrapression of the surface, and as it were by a puncture* (vulnusculum), *or insinuation, as with a compressed bladder,* 1, for every point of that particle conspires to the conservation of its form. 2. Thus it cannot be modified at a distance, nor does the disturbed surface communicate this. 3. Every attack made upon the surface returns to the substance itself.

106. *But when they are touched or compressed they sud-*

*denly compress themselves into smaller spheres, and dilate themselves into larger ones, the same form being always conserved, varied only in dimension and diameter, always remaining spheres of the same nature.* This is evident, 1, from their composition from similar and more perfect spheres, 2, which do not suffer another form to be induced upon them. 3. There is a striving together of all of them towards their own form. 4. This is seen from their similar nature in their smaller, indeed in their smallest volume perceptible to sight, 5, and in the smallest pores and vesicles, as in the lungs, a similar nature remains with the compressed particle according to the height of the column, if the air be compressed or dilated. 6. That pressure being removed a restitution and pressure results from the inclosed elastic particles. 7. It is similarly seen in vapors, 8, from the doctrine of forms. 9. That which produces the substantial form produces the accidental. 10. The space alone is varied.

**107.** *Therefore when the air is effected by a sudden or light compression, or by a blow, or other impulse, it similarly redounds,* wherefore, 1, the modification of its nature consists in the sudden compression and expansion, or action and reaction, therefore in the sudden rebounding of the particles into their original dimensions. 2. Wherefore if the modification should enter into the place where the air had been compressed, so that it should no longer be able to rebound, then the air would be destroyed.

**108.** *The more air is compressed, the harder it becomes, and the more strongly it rebounds;* 1. For it reduces it into a harder state, 2, the more it remains in that compression unwillingly. 3. It returns to the equilibrium of its exterior pressure, in which is the atmosphere itself. 4. Wherefore the modification is varied according to the density and rarity of the air itself, 5, as in diving bells under water, where a new pressure is added. 6. The pressure is insensible in air pumps. 7. For there is no rebound, except a light one, if the air be expanded. 8. The air is in its most complete equilibrium in our atmosphere, it is otherwise on the tops of mountains.

**109.** *Thence is sound, which is a modification of the air, or rather is to be called a modulation.* 1. Thus air suddenly com-

pressed, and its sudden rebound causes that which sound hears; 2. For the same is communicated to the membranes lying in the way, which are likewise elastic. 3. Nothing received in these membranes perishes.

**110.** 6. *That such modulation propagates itself to a distance according to the elasticity of the more perfect particles.* 1. As, for instance, sound reaches to a certain distance. 2. When one particle is compressed, also another is compressed. 3. This could not be without local motion. 4. All contiguous touch confirms this. 5. This appears from sound in aerial atmosphere, and from light in the ethereal atmosphere.

**111.** *Every modification derives its origin from external causes which impinge.* 1. The external cause is what acts upon the particles, or upon the volume of the particles. 2. The internal cause in the particles themselves does not come to sound or the sense of hearing. 3. This may appear from twanged strings, from the strings of a musical instrument, from harps, lyres, drums, or when the air is beaten by a somewhat hard flexible switch. 4. It appears from trumpets and other wind instruments which sound when blown into. 5. It appears from elastic plates, which vibrate when beaten, and communicate their vibration to the air. 6. It appears from the larynx itself, and from similar things. Thus it appears that what produces the modification must be outside the particles of the air, but within the atmosphere of the air. 7. Wherefore from the origin of motion.

# SWEDENBORG'S SUMMARY OF THE PRINCIPIA.

(Concluded.)

## Chapter VIII; Concerning the third finite.

The more kinds of finites, actives and elementaries that successively arise by means of multiplication, the more enriched, beautiful and perfect is the world. 1. The third finite as to its origin, parts, figure of the parts, position, motion, etc., is quite similar to its preceding substantials or finites, or to the second finites, the first finite, and the point. 2. The third finite consists purely of second finites. 3. Since this finite is similar to its antecedent finites, and is a third generation from the points, it is of the same quality with its antecedent finites. 4. [This finite] arises from the first elementary particles very greatly compressed, and indeed near the large active or solar space. 5. From these [finites] there may arise again new elementary particles.

## Chapter IX; Concerning the second or the magnetic element of the world.

1. The second elementary particle consists of third finites and of the actives of the second and first finites; and the above-mentioned finites occupy the surface and the actives the internal space. 2. The second elementary particles are, as to their origin, as well as to their figure, surface and space most similar to the first elementaries; they differ only in regard to dimension, namely, the second elementaries are larger in both space and figure, because they consist of larger finites and actives. 3. The second elementary particles possess the same elasticity as the first. 4. These [second elementary particles] may be compressed and expanded in like manner as the first. Their centre of gravity is in some part of the surface, and when in a state of compression is nearer the interiors than in a state of expansion. These elementaries have likewise an axillary motion and they make an effort to go into local motion. Those which are nearest the sun and which are in a greater

degree of compression [make an effort to go] into a lesser gyre and circle; but those which are more remote from the sun and in a lesser degree of compression into a greater gyre or circle. By means of such an effort of each, together with an accessory force from some active and central space, they spontaneously conspire to the vortical gyre which is most agreeable to them, which they also perpetually preserve by means of the same action of the sun and the force and effort inherent in each [particle]. 5. The surface of this second elementary particle is exactly equilibrated between two forces; within it is pressed by its active space, but without by the first elementaries. 6. These second elementary particles are in like manner pressed by others incumbent upon them, and the pressure of the incumbent [particles] is according to the altitude in the plane of the zodiac, and likewise according to the area subjected to the pressing [particles]; provided their volume be reduced by motion to a regular and vortical position. 7. The third finites constituting the surface of this elementary particle join themselves in like manner and become passive as do the second finites in the surface of the first elementary particle. 8. The finites constituting the surface, in like manner as the finites of the first elementary, turn their convex or lighter part toward their internal space, and they are thus compelled to cohere as to their poles. 9. The motion and essentials of the volume are similar to the motion and essentials of the parts in all the elements, and reciprocally. 10. The particles of the second elementary may be compressed to their minimum, in the same manner and by the same cause as the first elementary particles; and in the greatest degree of compression, or near the large, active, solar space, they change into new finites, which finites are the fourth finites and similar to the preceding. 11. In every particle of this elementary kind there is everything in the world which has hitherto arisen from the point; and every elementary particle is a least compendium of the world and its preceding entities; thus there is a most perfect harmony of the parts and the compounds, and a most close connection with the first.

## CHAPTER X; CONCERNING THE EXISTENCE OF THE SUN AND THE FORMATION OF ITS VORTEX.

1. The large active solar space appears to have primitively consisted of no other actives than those of the first finite. 2. No space or place can be occupied or enclosed by actives unless it be surrounded by finites, in which alone it can be terminated and limited, and consequently in relation to which it can be called a space. 3. By the immense action of the space the surrounding finites can be reduced into such a position that one touches the other, and consequently they can finite themselves and by means of motion among each other flow into second finites. 4. The second finites now surround and enclose the same solar space, since the first finites, for the above-mentioned reasons, coalesced into the second finites. In like manner these second finites, which are now proximate to the [solar] space, may in a considerable number enter the space itself and become actives. 5. The first and likewise the second elementary particles may now arise around this large active space, and may successively form a sphere which gradually grows larger until finally they suffice to form a certain large vortex around the sun. 6. In the state of formation of the vortex among the elementary particles, as they are increasing into an immense sphere or volume, no other force was needed than a certain active centre which would institute the action (*quod ageret*); otherwise the elementary particles themselves would spontaneously dispose themselves into a general motion in agreement with the figure of the parts; and, by means of the action which takes place in the centre, they would perpetually continue this motion both as to each particle and the whole volume. 7. The sphere of the elementary particles, from the action of the solar space alone, flows into a vortical motion, and this motion cannot but accord with the equators and poles of the parts, and hence must extend itself into a spiral figure at a great distance from the centre, and thus by the fluxion and position of the parts form a zodiac. 8. Elementary nature is similar to herself both in the greatest and least things; in the macrocosm and in the microcosm; in a heaven and in a [small] volume; in a world and in a particle.

## PART II.

### Chapter I; Concerning the causes and mechanism of the magnetic forces.

1. The first and also the second elementary particles, or the magnetic, are most apt and prone to motion; and indeed they spontaneously make an effort to go into a certain vortical motion, if there be only an active centre around which they can flow and gyrate. 2. In a volume of elementary parts all the motion is diffused and derived from a certain centre, where the origin of motion exists, to all the parts round about, and indeed to a greater or less distance according to the force of the centre, and the contiguity, elasticity and yieldance of the parts. 3. But motion among the elementary particles is not only propagated and extended according to the figure and natural position of the parts, but also terminates in them. 4. Hence it may be concluded that motion among the first elementary particles, and also among the second or magnetic, is diffused in every direction from the centre to all the circumferences; but because the figure and position of the parts is such that the poles and likewise the equators of all the particles are parallel, the motion among the particles is diffused in one way according to the poles and in another according to the equators. 5. Since the diffusion and emanation (*dissipatio et excursio*) of motion from the centre is of one kind according to the plane or parallelism of the poles, and of another and different kind according to the plane and parallelism of the equators of the parts, it follows that the motion cannot be diffused into circumferences equi-distant from the centre, or very similarly circular, but into the spiral ones. Such a motion in a volume of parts is truly vortical. 6. In this spiral or vortical motion the spires near the centre are formed with a greater curvature, but at a distance from the centre with a lesser curvature, and finally it terminates in a right line and thus in the natural position of the elementary particles. In a word, all motion among the elementary particles which we have called magnetic runs round the centre in a spiral figure; and when it has come to its state of rest it

comes into a rectilinear position, and into the same with the position of the parts at rest. In this consists all the magnetism, concerning which it will be treated. 7. These spiral gyrations we call vorticles. As many spiral gyrations or vorticles may arise as there are centres of motion, and the vorticles themselves may be conjoined among each other agreeably to their figure and motion. 8. If the vorticles are conjoined as to their spires and as to the harmony of their motions, they are also as it were mutually colligated by their conjunctions and tend to remain (*velle permanere*) in that conjunction. 9. Vorticles or spiral gyrations of this kind are more apt to conjoin and colligate themselves with each other the nearer they are, or the greater the curvature of the spires by which they are conjoined. At the least distance from the centre of motion there is the greatest colligation because there the gyration has the greatest curvature. In an intermediate distance the colligation is intermediate; most remotely there is evidently none because the gyratory motion begins to be determined into a right line. Colligation can also exist where the angle of the spire is less than forty-five degrees. The more centres of motion there are in the same plane the greater is the gyration or colligation of the vorticles; the fewer in the same plane the less is the colligation; and also, there are as many colligations as there are centres of motion. 10. Corpuscles consisting of pores and meatuses so subtile as to be permeable only by the magnetic elementary particles I call magnetic corpuscles, and especially if the pores or meatuses are rectilinear. Of this kind are the least corpuscles proceeding from magnets and iron, or effluvia. 11. Such corpuscles or effluvia, if they be free (*soluta*), cannot be quiescent, but gyrate continually round their centre and according to the position of the elementary particles; and consequently they constitute active centres and form around themselves spiral gyrations or vorticles. 12. Therefore, as is the number of magnetic effluvia such is the number of vorticles formed round the magnet. 13. The greater the abundance of such effluvia round about the magnet, the greater is the abundance of circles and vorticles; and the greater the abundance the more nearly and closely may they be conjoined and colligated as to their in-

terior spires; and *vice versa.* 14. The natural place of the effluvium is in the centre of such a vorticle; nor can the effluvium, residing and acting in its centre, eject itself out of its vorticle, but the effluvium is inseparable from the vorticle and is naturally carried in the same direction as the vorticle; and *vice versa.* 15. If within any hard or material body there be effluvia or least parts of this kind, free as well as bound, but [extending] in a right line or in a regular curve from one side to the other, or from one pole to the other, I hold that such a hard or material body is wholly magnetic. 16. The more regular the position of the particles and the greater the abundance of them both within and without the mass, the closer is the conjunction and the stronger the magnetism. 17. The colligation of the effluvia or vorticles is closer at a less than at a greater distance from the mass, and closest at its confines or boundaries, or near the mass. 18. The vorticles round about such a mass surround (*circumfusos*) each wall by a connection which is continuous from one pole to the other and thus they connect and enclose each wall by a kind of sphere. The sphere of the vorticles thus connected may remain for a considerable time around the whole magnet, nor is there any need for it to be constantly renovated and made whole by new effluvia, nor is the continual exhalation of such effluvia required in great abundance. The magnet itself (*lapidem magneticum*) likewise, surrounded by such a sphere of vorticles, cannot be removed from one place to another without the sphere being moved at the same time; nor can the sphere be transferred unless the magnet be transferred at the same time—the magnet and the sphere constitute as it were one body, nor can one be separated from the other, much less be transferred outside of the other, but the magnet in the centre of its sphere, whatever the position and motion may be, naturally and always accompanies the sphere, and the sphere its magnet. 19. Because of the connection of the vorticles from the one pole to the other, and the formation of the sphere, there exist two poles in the magnet; likewise two polar axes in the sphere at a distance from the magnet, which axes are not determined by the magnet itself, but by the sphere and its figure. 20. The axes of the vorticles are not in one parallel-

ism and position with the axes of the sphere, but the axes of the vorticles are incurvated according to the figure of the sphere, and the incurvation begins around the polar axes of the sphere. 21. The axes of the vorticles and of the elementary particles round about the magnet are in the same parallelism, and the elementary particles are arranged by the motion of the vorticles into the same position and into the same figure of position as the sphere. 22. All motion in the vorticle is according to the position of its axes, or the axes have a flexure according to the motion. If the axes are in a right line the motions in the vorticle are concentric, but if the axes are incurvated the motions are eccentric; and if several vorticles are in the vicinity of each other, according to whose motion and application the axes are to be curved, there is also at different distances from the centre or effluvium a different eccentricity. 23. The axis of the sphere, or the common axis of the vorticles, lies in a parallel position with the common axis of the element itself, in a very exact manner (*convenientissime*); but nevertheless it may be easily turned from this towards any quarter. 24. The axis of the whole sphere, or the common axis of the vorticles, may be incurvated in like manner; and together with it the sphere itself, from one pole to the other, may also undergo some change and be incurvated according to the polar axis. 25. By the application of two or more magnetic spheres the figure of each sphere is immediately changed and from two or more spheres arises a larger one, and the whole distance between the spheres becomes an axis. According to the different application of the spheres is the larger sphere thence arising differently configurated. 26. Two or more spheres applied to each other are more closely colligated at a smaller than at a greater distance. 27. The conjunction of spheres is most close and direct around the poles, but between the poles it is slighter and oblique. 28. The greatest part of the effluvia of iron or steel is magnetic, but because of the irregular position of the parts in iron or steel there is no regular conjunction of the effluvia or vorticles; thus neither is any sphere formed by the regular position [of the parts], nor can any magnetism be produced before the vorticles with their effluvia interiorily in the iron or steel are reduced and arrang-

ed into a regular position. 29. If the effluvia of the iron approach the effluvia of the magnet, or the sphere of one approach the sphere of the other, both spheres coalesce and unite into one that is larger and the whole distance becomes an axis and thus the magnetism is rendered stronger. Hence it follows that iron is conjoined with the magnet and the magnet with iron by means of spheres, that one invites and as it were attracts the other by a certain force, nor are they repelled and driven in different directions (*in diversum*) as magnets are by their similar or inimical poles; iron is also conjoined with the magnet in the degree that the common sphere either penetrates or surrounds the iron, and the whole mass of iron is conjoined with the magnet if the whole mass of iron be either penetrated or regularly surrounded, unless its weight should be greater than the force of conjunction of the vorticles or the sphere. 30. By the application and contact of the magnet and the iron all the effluvia which are in the compages of the iron, which are either entirely or partially free, are arranged into a regular position and the iron thus becomes magnetic.

CHAPTER II; CONCERNING THE ATTRACTIVE FORCES OF MAGNETS AND THEIR RELATION TO DISTANCES.

1. No magnet is absolutely similar to another, either as to its interior texture or as to the figure of its surrounding sphere; and the magnetism itself in the same stone may also be varied by the most diverse causes. 2. The attractive force or the conjunction of two or more magnets or pieces of iron depends not only upon the axis but upon the whole surrounding sphere. 3. The attractive force is stronger at a less distance from magnets—weaker at a greater; and there is none where the spires of the vorticles begin to embrace each other at an angle of forty-five degrees. 4. There cannot be two magnets possessing a similar attractive force, but in very similar ones there is always a constant geometrical ratio between the attractive forces and the distances.

CHAPTER III; CONCERNING THE ATTRACTIVE FORCES OF MAGNETS IF THEIR POLES BE ALTERNATED.

The magnetic sphere around both poles is not similar, nor is the axis at the south pole extended similarly to that at the

north pole, but in the figure of the sphere there is always on each side a difference and consequently the same force is not always exerted at each pole; nor is the attractive force of two magnets the same if the poles be alternated, that is, if the magnets be inverted and thus the homogeneous poles opposed to each other.

### Chapter IV; Concerning the attractive forces of magnets when their axes are in a parallel position.

1. When two or more magnets are so placed that the equinoctial of one lies upon the equinoctial of the other, the spheres of the two magnets combine into one that is larger and form a certain large axis between the poles of the magnets. But the spheres of two or more magnets are, as to the poles, mechanically so conjoined according to the motion of the vorticles that in the middle distance between the magnets they are in a parallel position with the axes, but at the sides they are in a perpendicular position, and consequently between the middle and extreme distance they are in an oblique [position]. 2. Two or more magnets when placed in a position in which their axes are parallel, or according to the equators, possess in like manner a conjunctive force, but not at the same distance as when they are conjoined by the application of their axes or poles.

### Chapter V; Concerning the disjunctive forces of magnets when the cognominal or inimical poles are applied to each other.

1. If two or more magnets be so applied to each other that the south pole of the one be opposed to the south pole of the other, or the north pole of the one to the north pole of the other, that is, if two cognominal poles are opposed to each other at various distances, the spheres of each magnet will coalesce into one large sphere. But in the middle distance between the magnets so applied the position and fluxion of the vorticles are nearly contrary to each other, but at each side they more and more inflect themselves into their natural and homogeneous position. And consequently in the middle of the

column there is a disjunction of the parts, but at the sides, or laterally, a conjunction. 2. If the cognominal poles be turned toward each other the magnets are partly repelled, partly attracted, and their repulsive force is increased according to the distances and ratio of the spheres, but is presently diminished at a lesser distance. When two or more magnets are opposed to each other then in the space outside their perpendicular line they combine their energies (*conniti*), if the poles be in the least oblique or the magnets be moved to one side [out of the line] of diametrical opposition. 3. There cannot be any constant rule between the distances and repulsive forces of two magnets unless the magnets with their spheres be absolutely similar. 4. Therefore, if two or more magnets be so applied to each other that the homogeneous or friendly poles face each other, then from two or more spheres arises a single larger sphere, whose poles are two, one at each end of the magnet, and the middle distance between the magnets becomes the axis, which equals the entire side of each magnet. But if two or more magnets are so applied to each other that their poles are parallel, but the equators opposed to each other, from two or more spheres there also arises a single larger one, having four poles, two in each magnet, but it is otherwise if their cognominal or inimical poles be turned toward each other. These things being assumed as a basis, an examination may be made as to the nature of the coalition of spheres, or what must be the figure of the larger sphere if more than two magnets be applied to each other; likewise [what it must be] if two or more magnets be opposed to each other in some other position more or less oblique from the axes or equator and at various distances and angles.

### Chapter VI; Concerning the attractive forces of the magnet and of iron.

1. When iron is applied to the magnet or the magnet to iron, from the two spheres there exists a larger one, which encloses the magnet as well as the iron, but not in like manner as when a magnet is applied to a magnet. 2. The reciprocally attractive force of the magnet and of iron is greater than the attractive force of two magnets. 3. The magnet exercises its greatest

force upon iron of a given proportion of mass and thickness; a less degree if the iron be too thin or if it be too thick. There is a maximum and a minimum in the mass and thickness of the iron, within which the magnet can operate with the greatest force. 4. The magnet exercises its greatest force upon iron of a given proportion of size and thickness; in less degree if it be too small, and in a less degree also if it be too large.

### Chapter VII; Concerning the operation of the magnet on ignited iron.

The magnet operates with less power upon iron red hot (*candefactum*) or ignited, than upon cold iron; and its force on ignited iron diminishes according to the degree of ignition.

### Chapter VIII; Concerning the abundance of the [magnetic] exhalations and their penetration through hard bodies.

1. The magnetic sphere is capable of very freely permeating not only volumes of the elements, as air and ether, but also water and flame; likewise hard bodies, as woods, stones, or metals. Nor do the effluvia which permeate the texture of harder bodies anywhere lodge, impinge against, or become affixed to, any of their parts or parietes, but flow with entire freedom throughout the entire mass, without contact, occursion, or incursion. 2. Nor can the magnetic sphere conjoin with itself any other kinds of metals than iron or steel only, or such as participate of iron. By a greater abundance of emanating effluvia the magnetism and conjunction of bodies is rendered stronger. Still, however, there is no need that a wave and abundance of effluvia should constantly emanate from the magnet so that the magnetism should be renovated and restored by a continual influx and efflux of effluvia. 4. Iron cannot acquire any augmentation of weight by friction against a magnet; but the least parts of the iron which become perforated in a right line and partially loosened by the friction of the magnet are only made transverse and put into a regular position, and thus the magnetism is communicated to the iron; and consequently neither does the magnet suffer a loss [of its

forces], but one magnet would be capable of rendering magnetic all the iron in the world. 5. Whoever wishes to form and establish principles by means of a certain geometrical and mechanical construction of things (*per nexum quendam geometricum et mechanicum*), and afterwards to confirm them by experiment, ought not to assume and refute the opinions and arguments of others, but only present causes and demonstrate the connection of the principles with the experiments.

### Chapter IX[1]; Concerning chemical experiments with the magnet.

1. By means of ignition and great heat (*excandescentiam*) the magnet suffers a loss of its forces, and all its rectilinear and regular [position of the parts], and together with these its magnetism; and consequently it assumes the nature of iron, nor is it able to form any regular sphere round about itself; and after becoming red hot (*candefactionem*) nothing remains which enables it to adjoin itself to another magnet except the parts of iron. 2. From sublimations, solutions and other chemical operations made on the magnet, its parts, and texture, nothing further can be elicited than that a magnet may consist of different kinds of parts, but that the magnetic strength and quality reside only in the iron particles. 3. By comminution of the magnet into dust the magnetic quality perishes and becomes confused. 4. However, by the application of some kinds of salts the interior parts of the iron or of the magnet may possibly become so implicated with them that there remains no abundance of iron or magnetic effluvia which may be exhaled and separated, until a melting heat frees the iron parts from their bonds.

### Chapter X; Concerning the friction of the magnet against iron.

The magnetic parts in iron are arranged into a regular position by means of friction and thus a magnetic sphere is formed round about the iron. But iron may be rendered most highly and permanently magnetic if it be brought into frictional contact with the magnet; but less magnetic if it be not in contact. If it be at a distance from the magnet it is indeed rendered

magnetic as long as it is within the magnetic sphere, but if the sphere be removed the mechanism immediately vanishes. 2. Iron is rendered most highly and permanently magnetic if all its parts or the whole compages be reduced into the same regular position, but less or very weakly magnetic if [it be reduced into a regular position as to the parts] only as to some points, or as to a short length. 3. When the least parts in iron are reduced into a regular position by means of friction they cannot by means of any numerous reiterated frictions be reduced into a still more regular order; neither can the magnetism of the iron be rendered stronger and stronger by a multiplication of frictions. 4. Iron is rendered most highly magnetic by means of friction if it be of a determinate magnitude, mass, thickness and surface. But the magnitude, mass, thickness and surface may be determined by experience, taking into account however the nature of the iron and of the magnet.

### Chapter XI; Concerning the conjunctive force of the magnet on several pieces of iron.

1. One magnet may consociate with itself in order several pieces of iron and may enclose all within one and the same sphere. 2. The conjunctive or attractive force of the magnet may increase and be rendered stronger by the application of iron, or by an armature. 3. There can be no two magnets which are absolutely similar as to their conjunctive force.

### Chapter XII; Concerning the operation of iron and of the magnet upon the mariner's needle, and the reciprocal [operation] of one [needle] upon another.

The sphere of effluvia around iron extends itself to a great distance, so that the vorticles or gyrations of effluvia emit themselves like radii on every side and arrange the magnetic element itself into the same position, so that the magnetic element regards the iron as its pole or centre from which the vorticles go forth in a long series. Such as is the position of the vorticles or the figure of the sphere, such also is the position, or figure of position, of the elementary particles vortically moved. 2. Innumerable spheres, as well those which pertain

to iron or those which are magnetic, may be formed within one and the same [larger] sphere. 3. In every magnet there are forces and qualities of two kinds; one, of conjoining with itself another magnet or piece of iron, which is called the attractive force; the other, of accommodating itself to the parallelism of the magnetic element or to its poles, which is called its polar force or declination. 4. Within the sphere of the iron or at some distance from it the mariner's needle becomes turned toward the iron not by an attractive force, but by its own polar quality. The axis of the sphere, or the common axis of the vorticles, lies the most conveniently in a position parallel with the common axis of the element itself; but nevertheless it may be easily converted therefrom towards any other quarter.

### Chapter XIII; Concerning other methods of rendering iron magnetic.

Iron may be rendered magnetic by other modes besides friction and contact; the art and method [of effecting it] consists only in reducing the least parts, which can exhale in the form of effluvia, into a certain regular position. If therefore iron be exposed to the continual action of the magnetic element for a considerable and stated time, it will be rendered magnetic, especially if it be kept [in a position in agreement with] the parallelism of the elementary particles. 2. Iron may likewise be rendered magnetic by repeatedly stretching and bending it; as also by a regular rasping and by hammering it out. Experiments therefore confirm [the position] that all the magnetic force consists only in the regular position of the parts, and that all effluvia from iron are magnetic (*mere esse magnetica*). From these data there flows mechanically all that has been said concerning the modes and qualities of the magnetic forces in the magnet and in iron.

## PART III.

### Chapter I; Comparison of the sidereal heaven with the magnetic sphere.

1. All the elements, as was taught in the first part of our *Principia*, operate in the same manner in a small volume as in a great one; in a volume in the same manner as in a system;

in a vorticle around the magnet, as in the great vortex around the sun. They operate in the same manner whether the centre be some insignificant effluvium continually movable round its axis, or whether it be a large active or solar centre which is continually movable. In the heaven or finite universe there may be innumerable vortices of this kind if there be innumerable active centres; or there may be as many vortices as there are suns or stars. 2. The motion of each vortex is from the active or solar centre to the circumferences; but the motion towards the equators of the parts is not similar to the motion towards their poles on account of the geometrical difference in the figure of each part. By such a diversity of motion the formation of the spiral gyrations is towards the poles and axes of the parts; that is, in the larger system, towards the poles of the zodiac. The spiral gyrations have a greater curvature when they are near an active centre, or near a sun or star; from which the farther they are the less is their curvature. That spiral motion according to the poles and axes of the parts is expanded and unfolded into one more and more rectilinear, and finally it ends in a common or rectilinear or parallel position of the parts. 3. Two solar or stellar vortices are more closely colligated by the spires nearer to the centres than by those which are more remote, as is plainly the case with the magnetic vorticles. They [the solar or stellar vortices] may be colligated either at a great or at a small distance; they may be reciprocally colligated if their axes be opposed to each other, but not if their equators be opposed to each other. Colligation according to the poles is direct, but that between the poles and equators of the parts is indirect and oblique. There is no colligation according to the equators of the parts, that is, in the great vortex, according to the zodiac. The centres of motion, or the suns or stars, may thus be at greater or less distances from each other. If there be several in a smaller space or at a smaller distance, the gyration of one is not disturbed by that of the other. 4. The active, solar or stellar spaces in the middle of the vortex are there in their own natural locality; they cannot be removed out of the vortex; the centre is indivisible and inseparable from the vortex, and the vortex from the centre, and one follows the other. There cannot be two or more suns,

stars or active spaces in one vortex. 5. Further, one vortex with its active centre constitutes one heaven by itself, or one world (*mundum*). Several vortices with their centres form together a certain sphere. A sphere consisting of many vortices of the same kind has its own figure and the figure of the sphere its own axes. The vortices inflect themselves in every direction from one axis, and curve it toward another; around the other axis they inflect and incurvate themselves in like manner, and by the colligation of the vortices the sphere passes over to another axis; thus the sphere is so colligated with its axes, that all the vortices in the entire sphere refer themselves to axes, so that no vortex can be moved out of its place, unless the figure, connection, order and course of the whole sphere be in some measure disturbed. Vortices are larger and larger in the proportion that their distance is greater and greater from the axis and in the axis. The whole visible sidereal heaven is a great sphere, and its suns or stars together with their vortices are parts of the sphere connected in the manner which has been mentioned. 6. The axes of the vortices in this sphere are variously inflected or incurvated and all the elementary particles in this sphere have the same position as the vortices themselves, or the sphere itself; and thus the vortices, as well as all the elementary particles in the very axes of the sphere, are in a rectilinear position, but those extending from the axes in a curvilinear position, or one which is inflected relatively to the axes. The elementary particles in the whole of this sphere or sidereal heaven do not regard one and the same pole, except in the verimost axis of the sphere. All the vortices or worlds which are in this axis possess the same poles; but all the vortices or worlds out of this axis do not possess the same poles, but the poles are according to the position of the worlds in the sphere. 7. There may thus be axes variously inflected according to the application of the neighboring or circumambient vorticles. If the axis of a vortex be inflected, the spiral gyrations according to the equators of the parts, that is, according to the zodiac of the vortex, are not circular but elliptical. The active centre cannot be in the middle of the vortex, but is in one of its foci (*sed in umbilico*). If the axis be variously inflected, then at various distances from the centre there are vari-

ous ellipses, or various eccentricities, relatively to the active centre. The planets move (*circumfluant*) elliptically in a vortex of this kind, the axis of which is variously inflected; and their sun is not in the middle or centre of the vortex, but situated variously in one of the foci (*sed illum in umbilicis varie teneant*). All the vortices which are directly in the very axis of the sphere or sidereal heaven are not inflected as to their axes; but their gyrations are spirally circular, and their centre is in the middle; but around the axis, where they begin to circumflect themselves, their gyrations are elliptical, and their active centre is not in the middle; and thus there are different and numerous eccentricities. Consequently our solar vortex is not in the axis of the sphere, but is near the axis where there is a considerable incurvation or inflection. 8. The common axis of the sphere or sidereal heaven seems to be the galaxy where there is the greatest congeries of stars. Along the galaxy all the vortices are in a rectilinear position and series and cohere as to their poles; likewise, they are there colligated more intimately and with spires of greater curvature. The other solar or stellar vortices afterwards proceed from the axis and variously inflect themselves; but, nevertheless, all refer themselves to that axis. 9. No change can occur in one vortex which is not in some manner felt in the others even to the axis and hence throughout the entire sphere. 10. From a given eccentricity and elliptical figure at various distances from the centre the skilful geometrician may come to a conclusion as to the position of the neighboring vortices and the incurvations of the axis; and, contrariwise, from the given position and distance of the neighboring vortices, and from the incurvations of the axis or from the position of the parts, he may come to a conclusion as to the spiral gyrations which may exist at various distances. And thus from given ellipses or orbits of the planets he may know the incurvations of the axis, likewise the position of the neighboring vortices, besides several other things. 11. There may be innumerable spheres of this kind or sidereal heavens in the finite universe; these may be colligated with each other like the spheres of two magnets; and the whole visible sidereal heaven is perhaps but a point in respect to the universe.

CHAPTER II; CONCERNING THE DIVERSITY OF WORLDS.

1. No world (*mundus*) can exist, abounding in any variety of visible things and phenomena, unless it arise successively, and during intervals of time, and by successive changes (*vices*), and contingencies, modes or modifications; by series of things successive, simultaneous and co-existing, and by connections of series, and iterated separations and connections, whence arises the perfection of its compositions. A world is more perfect in the degree that a greater number of changes and contingents concur in its formation, also in the degree that there are more modifications and existences thence arising of things successive, simultaneous and co-existing, and their connections, or, in the degree that there is a greater series of the things and the connection of the series (*serierum*) more multiplex. 2. The world subsists by the same series by which it existed, and, as to its subsistence and existence, perpetually regards its first. The more perfect the world exists and subsists the better it is able to regard its first and consequently it is more perfect and beautiful in its direct than in its oblique series; in things composite and connected than in things simple and separate; in series possessing a greater and freer motion than in those possessing one which is less. 3. The changes and contingents may be infinite, as also the varieties of modifications, and hence there may be infinite genera of entities compounded simultaneously as well as successively, and afterwards connected; and consequently there may be infinite series of these entities. If the world consists of a series of parts and compositions arising simultaneously and successively there may be as many series as there are worlds, or as many worlds as there are series; and thus there can never be a world altogether similar to another one. 4. Nevertheless, geometry is similar in every world, and likewise nature and mechanism as to principles and motive forces; but the diversity consists only in the diversity of series, in respect to degrees, ratios, and figures.

CHAPTER III.; CONCERNING THE FOURTH FINITE.

It is similar to the third fiinite, this to the second, this to the first, and this to its simple or point; consequently this fourth

finite is similar to all and to the point; whence also it is moved similarly, it can be similarly passive, and constitute the surface of some particle, and can also be similarly active. Its attributes, essentials and modes are similar to those of the third finite, from which it differs only in dimension, and consequently in respect to degrees and moments. Its origin is similar to that of the preceding finite, namely, from the second elementary particle, as the third is from the first elementary particle. The cause and place of its origin are similar, namely, near the active solar space, where the second elementaries were capable of being compressed into finites.

## Chapter IV; Concerning the universal chaos of the sun and planets.

1. By reason of the same causes as in the case of the first elementaries, the second elementaries are most highly compressed near the active solar space, and by this very high compression they cease to be elementaries and finites come into existence; but these finites are of a higher dimension [than the preceding finites] and are the fourth in order, the former being third in order. 2. Although all finites possess the power of actuating themselves, nevertheless, these finites which have arisen near the sun cannot become actives and introduce themselves into the solar space to its actives, on account of a difference of velocity, circles, and mass. But the actives which may have been casually made immediately cease to be actives and thus necessarily remain mere actives round the solar space of the actives; and consequently the functions they perform there are those of guarding and defending, so that the other finites of the same genus may not enter into the solar space and any longer introduce themselves into it. 3. Thus the number and abundance of finites of the fourth kind increases more and more by the successive compression of the elementaries, and there is a condensation around the solar space. Thus these finites concrete into an immense volume, and they crowd and enclose the sun like a crust; nor do they cease [to act] until the vortex is fully formed. 4. Nevertheless this crust, formed of fourth finites around the sun, is rotated in a certain gyre; it is thus representative, as it were, of an

active centre in forming and perfecting the vortex, around which, consequently, the elementaries can nevertheless flow like a vortex, but with a force and power different [from that which they would possess] were the solar space to act nakedly and contiguously upon its circumfluent elementaries. The whole of this immense crust, together with the enclosed solar space, is not unlike an elementary particle, for within an elementary particle is the active space, without the finites flow; and thus as to figure and motion this chaos is, on an immense scale, an effigy similar to each individual part in an element. Thus, again, nature is similar to herself in greatests as in leasts; thus does she appear in her immensity and at the same time in that which is very small. 5. This crustaceous matter, being endowed with a continual gyratory motion round the sun, in the course of time removes itself more and more from the active space, and in so removing itself occupies a larger circle and consequently becomes attenuated until it can no longer contiguously cohere, but bursts in some part or other. 6. The solar crust, being somewhere disrupted on the admission of the vortical volume, collapses upon itself, and indeed toward the zodiacal circle of the vortex, or according to the position and motion of the elementary particles, so that it surrounds the sun like a belt or broad circle; and this belt, which is formed by the collapse of the crustaceous expanse, in like manner gyrates and removes itself [still farther], and in removing is attenuated until finally it bursts and forms into larger and smaller globes; that is, into planets and satellites of varying magnitude, but of a spherical figure. 7. This crustaceous expanse may subside partly into itself and thus consist merely of a volume of finites. It may partly subside inwardly toward the solar space and thus revolve itself around some active space, or it may partly subside exteriorly toward the vortex and thus enclose a volume of elementary particles. Thus there may exist bodies of three kinds, namely, planets, their satellites, and the bodies wandering around the sun which we are accustomed to call sun-spots. It follows that these bodies, separated into globes, consist of fourth finites, and that they project themselves into the field of the vortex according to their magnitudes and weights and in the course of time more and more

remove themselves from the sun until they arrive at their fixed circumference or orbit in the solar vortex where they can be in equilibrium with the volume of the vortex.

### Chapter V; Concerning the ether or third element of the world.

Every planet therefore, however great, is nevertheless such as is the finite, or it is only a large finite; the difference is only one of degrees and dimension. And if a planet derives its similitude from its own finite or its individual [parts], it does so especially in regard to its tendency to a similar motion, or a similar intrinsic and progressive motion, and a similar axillary motion. Planets which are rendered active by their local motion round the sun have the same motion as actives. 1. The fourth finites, of which the infant earth consists, cannot actuate or finite themselves still further, that is, they cannot form themselves into similar larger finites except near the surface; but not between the surface and the centre, because there they have no place to unfold themselves. Even near the surface they cannot actuate themselves because the vortical element or the first elementary particles flow around, press upon and impede them, and whenever they are set free immediately absorb them. The earth thus floats in an elementary volume, or in the vortical element of the sun, with which alone it is now enveloped and equally pressed on every side. 2. These fourth finites flow more at liberty near the surface of the earth, and there only can dispose themselves and have free scope for any motion; this is a consequence of the former proposition. Thus they are there occupied by the particles of the circumfluent element and formed into new elementary particles, which contain within a small volume of the particles of the first element, the fourth finites constituting the surface; that is, those finites of which our new orb consists; and these new elementary particles are identical with the ether. In the course of time there came into existence a very great abundance of these elementary particles, or ether, because an immense volume of elementary particles may arise from a small volume of finites, and thus the new earth experienced a considerable diminution at its surface before the whole sphere of ether was entirely formed around it.

3. Because this new earth is continually rotated round its axis and exposes once every day its whole surface to the sun, these new elementaries which arise on the surface are generated over the whole of the surface and do not proceed from one part more than from another; and thus the earth, however diminishing [at the surface], nevertheless retains its spherical or oval form; and since, as was said, it has an axillary rotation, the elementaries just produced are immediately, together with their earth, carried into a certain motion. As it were colligated together by means of this motion they arrange themselves round the earth, neither do they suffer themselves to be carried in any other direction, and this [is the case] while the sphere increases from its minimum to its maximum. 4. The ethereal particles are much larger than the first and second elementary particles and they differ also in this, that the ethereal possess an internal space consisting not of actives, but of elementaries, but the first and second elementaries consist of pure actives; consequently they are not similar in figure, but the ethereal are most exactly spherical, while the first and second elementaries have poles or polar cones. 5. These new spherical particles cannot but be in perpetual motion and the first elementaries which are enclosed dispose themselves in every manner suitably to the motion of their composite or the ether, and so much the better and more suitably in the degree that the ether is in a greater motion, namely, according to the degree of motion they arrange themselves in order from the centre to the circumference; and thus the enclosed elementaries which are near the centre are more expanded than those which are near the surface. The enclosed first elementaries lie in the position which is the most natural to them, and the more in proportion as the motion of the ethereal particle is more intense; and in this position they are insensible to the motion of the surface or of the whole particle. 6. The ethereal particles thus formed may exist with perfect aptitude under any kind of motion; and the surface itself is expanded and equilibrated between two forces or is pressed as much from without as from within. 7. The ethereal particle thus formed and equilibrated is most highly elastic and therefore deserves to be called elementary; but it owes its elasticity to the enclosed first elementaries in which is latent

the primitive elasticity. Only by the aid of the enclosed elementaries may it be expanded, compressed, and [be made to] yield, and it derives its elementary nature from the first elementaries, and thus it is endowed with the character of an element (*elementata sit*). Nevertheless in every degree of compression and expansion it is most exactly spherical, and the more exactly spherical the more it is moved. 8. The ethereal particles and the first elementaries differ in this, that in a higher degree of motion the former more and more expand themselves and become less elastic, and thus they offer a greater resistance to any external force. But the first and second elementaries when the degree of motion is higher become more compressed, and when compressed become less elastic and with all their force resist an external pressure. Consequently the expansion of the particles of ether is more tense (*durior*) in a greater motion and more flaccid (*flaccidior*) in a lesser motion; the tension of these particles is always proportioned to their degree of motion, and consequently in every degree they are more or less tense. 9. Under every degree of extension and compression the ethereal particles are most highly mobile, and in their state of tension they are most highly active. 10. By their tension when they are in the highest motion as well as by their compression when they are under an incumbent weight they may arrive at such a degree of resistance that they cannot become more elastic, but like hard bodies they resist every compressing or opposing force. 11. They may also be expanded without motion and in such an expansion which has arisen without motion they are not rigid but elastic. The more expanded they are and the more quiet, the more laxly (*laxius*) elastic and yielding they become; also, the more compressed they are the less or more rigidly (*rigidius*) elastic do they become. 12. In the highest degree of expansion the elementaries may become disrupted and cease to be elementary; but nevertheless the finites, inhering in their surface, and which are now falling away by reason of the disruption, cannot actuate themselves, but immediately illapse into some of the surfaces of the neighboring particles and there continue their motion as finites in some other surface as before; so that by the dissolution of the particles and their illapses into

the neighboring surfaces there is given to the neighboring particles the faculty of further expanding themselves and of occupying more space, so far as the quantity of enclosed elementaries permits. 13. The fourth finites constituting the surface of the ether are placed in a most regular position, [extending] as it were by continual spires from one polar point to its opposite; and by means of this position of the finites there is a mutual connection between them; consequently a motion received by such a surface cannot but, on account of the contiguity and position of the parts, circumfuse itself in a moment and occupy the whole surface of the particle simultaneously. And thus, by means of the spiral position of the parts in the surface, these ethereal particles arrive with difficulty at a state of rest, especially when rendered the more rigid by motion, in which case they revolve with the utmost rapidity round a centre in the same manner as the first and second elementaries around their axis. 14. The surface of an ethereal particle may be doubled, tripled, or multiplied in various ways within, and this in its state of compression; but the part of the surface which recedes towards the interiors is convolved into new spherules and bullules, or such as are similar to the larger; and in a greater degree of compression the bullular spherules thus formed within are multiplied, and when multiplied arrange themselves from the surface toward the centre. These bullules nitent within are, in the state of expansion of the ethereal particle, again set free, and they recede to the surface and enter into the expanse. It follows, moreover, that in its highest degree of compression the entire ethereal particle is at length occupied from the surface to the centre by similar small spheres and thus ceases to be both elastic and elementary, becoming hard and similar to a kind of material finite. 15. The elasticity of the volume is such as is the elasticity of each particle; and the elasticity of an inferior volume is equal to the weight of the whole superior volume pressing upon it, because they press and are pressed [in proportion to the weight of the incumbency], and by means of this incumbency it is that they secede into themselves in the manner which has been mentioned; hence in order that they may sustain the superincumbent weight their elasticity must be similar to the force and weight

of the superincumbent volume. It follows also that the elasticity of the compressed volume is greater than the elasticity of the same volume when dilated in proportion to the mass or weight of the superincumbent volume. But nevertheless it is not a consequence from this that the density of the inferior [volume of] ether is in like manner proportioned to the density and weight of its superincumbent volume. 16. The ethereal particles mutually press upon each other according to the altitude or weight of the superincumbent volume. They likewise press most equally in all directions, upwards, downwards, and obliquely; [their pressure is] also according to the side or angle opposed to them at any given angle. The elasticity also makes an effort [to proceed] in every direction. They [the particles] likewise exercise such a pressure in every direction upon the interior parts of any hard body, whose pores and the interstices of whose texture they are capable of entering and permeating, and thus they [the particles of the hard body] contain the lesser parts [those of the ether] within their texture (*inter se*). 17. The motion of the volume of the ethereal particles is such as is that of the particles. It is most perfectly equal in all directions, otherwise than the motion of the volume of the first and second elements. Every particle contributes something to the motion of the volume and thus from the figure and mechanism of the particle may be seen what is the motion of the volume, and from the figure and mechanism of the motion of the volume what that of the particle is. 18. Particles moved in volume (*volumatim*) nevertheless preserve their equilibrium among one another in their mutual positions and cannot by reason of any general motion be forced out of their equilibrium or natural state. Consequently in a single volume in motion there may exist innumerable other volumes, and indeed as many as there are centres or causes of motion, or as many as there are particles. Nevertheless every volume, from a motion arising from its centre, diffuses and configurates itself most equally and regularly according to the geometry of the parts; that is, spherically. 20. If the volume of ethereal particles flowing from a centre into perpetually equidistant surfaces pass through any hard body or its more open meatuses so that the motion of the fluent ether be continued from the other side in the same

ratio, course, and mechanism, I say that such a body is transparent or pellucid; but if it pass through irregularly so that, the flowing of the ether being changed, the motion be variously continued from the other side, I say that the body is of a white color. A volume which is directly moved from a centre extends itself like rays, and where it cannot pass through it is reflected and indeed according to the angle of incidence, just as all elastic and spherical bodies are resilient from any other elastic or hard body; but if [the volume of ether] pass through it is reflected and refracted according to the same angle, or that of incidence. Within one volume in motion there may be similar and dissimilar motions, motions concordant and discordant, motions more or less harmonic; and all these may simultaneously pass through the organs of the eye and simultaneously and similarly present themselves to the soul. 21. Motion diffused from a given centre through a contiguous medium (*per contiguum*) or volume of particles of ether produces light, for by means of this motion the ether is reflected from every entity it meets and thus an idea (*idea*) of the thing is presented to the eye. The central motion of the particles of the ether causes not only a rigid expansion of every particle, but also heat; and if this motion be urged from some centre towards circumferences light together with heat is caused. But if the motion be urged from centres towards circumferences, or into a local motion without the central circumvolution of every particle, there thence exists light in a cold state. There are corpuscles which resemble a kind of effluvia which are so small that they can move only a volume of ether, but not a volume of air; if they be spontaneously moved light is excited to [some] distance; if they are not moved spontaneously, but by means of the tremulation of the parts in a hard body in which they are, light is also excited and likewise electricity, as long as the tremulation continues.

### Chapter VI.; Concerning the fifth finite.

It must arise where there is a quantity of finites of the fourth kind, and in the place where the latter can somewhat unfold and finite each other. And because the fourth finites are now nowhere else than in the planets or here in the earth, neither

can they unfold and finite themselves in any other place than around the surface of the earth, not even between the surface and the centre because there they have no room for unfolding themselves; hence it follows that they must arise near the surface of the earth, and indeed at some distance from the sun where the pressure of the vortical element is not so great as in the vicinity of the sun.

### Chapter VII.; Concerning air or the fourth element of the world.

Air consists superficially of fifth finites and within are enclosed the first and likewise the second elementaries; thus air is most similar to ether from which it differs only in degrees and dimensions. With regard to their locality, the origins of the ethereal and aereal particles are similar, namely, near the surface of the earth, where, as was said, the ethereal particles came into existence. With regard to the manner of their origin, the aereal particles originate in a manner similar to that of the ethereal, namely, among the first and second elementary particles. The aereal and ethereal particles are consequently similar in form and differ only in magnitude and dimension. 1. In the course of time there is produced a great abundance of these elementaries, or of air, because an immense volume of such elementaries may arise from a small volume of finites; thus our new orb, always decreasing as to its surface, becomes considerably diminished before the whole atmosphere around it can be entirely formed. The things *concerning air* [which now follow] are similar to those *concerning the ether* [concerning which see the *Principia,* Part III.], Chapter V., sections 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 18; [concerning which see above in Chapter V., on *Ether or the Third Element of the World*].

### Chapter VIII.; Concerning fire or the actives of the fourth, fifth and following [finites].

Finites of every power and dimension may actuate themselves, if only they have space for so doing, or for running very freely, naturally, and without retardation into their circles, and if only they are not implicated in circumfluent elementaries

and become convoluted into surfaces or new bullular, superficial, or elementary particles. 2. There are no actives of the third finite, but all [the particles of this kind] are third finites and in the surface of the second elementary particles. The actives of the fourth finite constitute a subtle elementary fire, the actives of the fifth finite the common or culinary fire. 3. There also apply to these actives the things which were mentioned above in Part I., Chapter V., section 7; also, Chapter VII., sections 6, 7, 8, 10, 11, 18, 12, 13, 14, 15, 16, 17, 19, and in Chapter V., sections 8, 10, 11, 12, 13, 14, 16, 16, 17, 18, 19 20, 21, 22; and, in the same chapter, sections 14, 27, 29, 29, 30. 4. The fifth active is nothing else than the fifth finite set at liberty, or sent into space, where, like the preceding actives, it can run freely into eccentric circles and gyres, by means of which it may form as it were continual surfaces, and thus by its weight and impetus act upon the things it meets. These fifth finites, as to their greater part, constitute the surfaces of the particles of air. The active of the fourth finite is nothing else than the fourth finite set at liberty, or sent into a space, where, like the preceding actives, it can run freely into eccentric circles and gyres and by means of them form as it were continual surfaces and thus act upon the things it meets with velocity and mass or weight. These fourth finites, as to their greater part, constitute the surfaces of the particles of the ether; they likewise occupy the central globe of the earth. [5. The fifth finites cannot become active as long as they occupy the surfaces of the particles of air; and if by chance they should be set free from the surface by the expansion of the particles of air, they nevertheless cannot become active without immediately illapsing into the surfaces of the remaining particles of air, and there, together with their like, performing a general motion; the case would also be similar with the fourth finites in the surfaces of the particles of ether.] 6. The actives of the fifth finite cannot form any active space except among the particles of the air, by which they are enclosed and bounded on every side, and thus they can form no space among the particles of ether, and still less among the particles of the more subtle elements, or the first and second. These actives cannot have any boundaries, but become immediately dissipated unless enclos-

ed by the particles of air. In like manner the actives of the fourth finite can form no space except among the particles of ether, but not among the particles of air, nor among the second and third elementaries, because they would be immediately dissipated. 7. The space formed by the actives of the fifth finite in the volume of the particles of air cannot subsist unless the space be constantly supplied with a fresh quantity of actives; that is, unless the active space continually receive fresh aliment. Otherwise the actives are immediately occupied by the first and second elementary particles and converted into particles of air, or they illapse into the surfaces of the circumambient aereal particles and thus perish and are dissipated. In like manner the space formed by the actives of the fourth finite in the volume of particles of the ether cannot subsist unless continually fed by new actives, otherwise they become immediately occupied by the first elementaries and converted into ethereal particles, or, illapsing into the surfaces of the circumambient ethereal particles, they perish and are dissipated. 8. A great abundance of the [fifth] finites or actives of the fifth finite enter into the compages and texture of mundane bodies, such as vegetable, sulphurous, oily, and other [substances], from which new actives may continually emanate and germinate into the active space, that is to say if those bodies are in the space itself. Many aereal particles may also enter the compages and texture of these bodies, and simultaneously with the solution of the bodies rush into the active space. Aereal particles, which are separated from the volume of their particles and merged into an active space, immediately become free, and all fifth finites residing in their surface thus become actives; in this manner fire may receive much aliment from the air. The case is similar with the actives of the fourth finite which reside in the surface of the ethereal particles. 9. The particles of air nearest the active space are in the highest degree of motion and consequently most highly and rigidly expanded. But those which are more remote from the space are in a lesser motion and in a lesser expansion and tension, and thus [there is a ratio] according to degrees of distance from the space. In like manner the active space cannot subsist unless the aereal particles be expanded according to their distance from it; that is,

unless there be formed around the space a sphere of particles gradually less and less expanded and mobile. The case is similar with the ether around a space consisting of actives of the fourth finite. 10. The aereal particles themselves, when put into the highest degree of motion by the actives of a space, present something which is similar to the actives themselves; they likewise produce something which is igneous and warm and dissolve the connections of certain parts. Thus, in their state of expansion and mobility, the aereal particles resemble a kind of active, but not in this, namely, that they do not excite the volume of ethereal particles into such a motion that any light is diffused round about. 11. The ethereal particles can be in the same space together with the actives of the fifth finite, but when in that space they are excited to a most intense motion, and consequently when thus moved they are very highly expanded and made rigid. The ethereal particles thus contribute in a signal manner to the degree and production of heat. The actives of the fifth finite may in their space urge an ethereal volume into such a motion that the original [motion], appearing in its modifications, presents light. The ethereal particles also which are within the space may be dissolved and the space thus made stronger and larger by the actives of the fourth finite. Finally, the ethereal particles may also be in some measure exterminated as the active space is increased in force and extent. 12. The first and second elementaries can be in one and the same space with the actives of the fifth finite and not at all disturb their circles and gyres and yield to them, just as the atmosphere yields to a weight which is gyrating and revolving within its volume. [13. The force of the active space increases according to the abundance or number of actives collected in the same space, and according to the addition of the actives of the fourth finite to the number of the other antecedent finites.] 14. The space consisting of the actives of the fifth kind has no weight except what is given to it by the volume of ethereal particles or of the first and second elementaries forming what is contiguous in that space. This space has no determinate position except that which is contributed or determined by the enclosed ethereal particles and elementaries, likewise by the aereal particles, which are

circumfluent and made lighter by their expansion. 15. The actives of the fifth finite operate by their degrees and impetus upon the things they meet and dissolve their connections. The ethereal particles also, which are in a state of most intense motion, operate upon them by their central gyrations and the activity flowing thence, likewise by their expansion. And the space itself, by reason of its lightness, acts upon the connections of the harder bodies, and dissolves them by the equilibrium and ratio of its pressure on both sides, that is, both without and within the compages of the bodies. Several causes may thus concur in the solution of bodies by fire in an active space. Now because the active space cannot subsist except by means of new actives, which perpetually enter into the space and so constitute it, it follows that it cannot subsist unless it be always replete with parts of the same kind and which the above mentioned actives supply by their dissolution, so that the space must thus be crowded with sulphurous, oily, saline, vegetative, and several other kinds of particles, whence it is that the space can extend itself no further than the tide of those particles from which the actives come. From this it also follows that it may be stronger or weaker according as the parts floating in it supply a less or greater abundance of these actives. 16. The space consisting solely of actives of the fourth finite and enclosed by the ethereal volume can pass through the atmosphere with a very free current; it may cleave through and penetrate even hard bodies, and in its passage it may break and dissolve their more subtle connections and present phenomena in addition to those presented by a space of actives of the fifth finite. 17. The central globe of the earth consists of fourth finites, but these finites cannot break forth and actuate themselves without being immediately occupied by the first elementaries and converted into ethereal particles, according to the theory presented above. But if there were a passage leading from the centre sufficiently open for the above mentioned finites to break forth through it, an active space would be formed by that part at our present distance from the sun; and having been formed it might subsist as long as fresh finites constantly emanated and germinated into the space. But by means of such a space the sphere of the ether would grow

considerably and the earth would lose that equilibrium which it now maintains at its present distance from the sun and in its present vortex; consequently it would undergo some signal change not only in regard to its position and its circle in the vortex, but also in regard to its polar position and axillary motion.

### Chapter IX.; Concerning water or the purely material finite.

1. A particle of water is similar to a compressed particle of air in which there remains nothing elementary, yielding and elastic, but a something hard, consisting of contiguous spherules formed within another larger spherule. The particle of water is not a finite like one of the preceding finites, namely, capable of actuating itself, but it is a purely material finite. Consequently water is not an elementary particle. 2. [Particles of] water or finites of this kind cannot move among one another like elementaries unless there be interfluent elementaries to carry these particles with them into motion. The [particles of] water thus entirely owe their whole motion and fluidity to the interfluent ether; and the aequeous particles are the more mobile and fluid in the degree that the circumfluent ethereal particles are the more mobile, extended, and rigid, and the less mobile and fluid in the degree that the circumfluent ethereal particles are the less mobile, extended, and rigid, but as it were flaccid. And when at length the ethereal particles become deficient in mobility and tension it is plain that the aqueous particles must grow torpid and languish, uniting and concreting into a hard mass. 3. The ethereal particles are capable of permeating the interstices of water; but the aereal particles cannot do this on account of the difference in their dimension. The aereal particles are therefore contiguous with the aqueous as to surface and are incumbent upon them according to the altitude or the weight of their volume.

### Chapter X.; Concerning aqueous vapor or the fifth element.

1. Vapor is formed on the surface of water, and indeed from the motion of the interfluent ethereal particles. When vapor is formed it encloses within itself a small volume of ether; ex-

ternally, however, it is pressed by both the air and the ether. The surface is thus equilibrated by forces from without and from within and preserves its spherical form under every degree of compression. 2. Vapor may be compressed and dilated and thus it possesses a yielding and elastic surface; but it owes all its elasticity to the enclosed ether, and the ether to its enclosed first elementaries. Thus vapor is a particle not fully yielding and elastic, consequently not fully elementary, but similar to an elementary, or endowed with elementary properties (*clementata*). The surface of the vaporous particle may be variously multiplied and in its state of compression it consists of numerous duplicatures, series, and expanses, but in its state of expansion it consists of fewer duplicatures, series, and expanses; thus it may be expanded and compressed according to the governance and state of the enclosed ether and the surrounding air. 3. A large volume of vapor may arise from a small volume of water and this volume may become more and more expanded by heat when there is a fire near it. It may be expanded with so great a force and tension (*rigore*) that large weights may be lifted up and walls of iron and brass be burst asunder. Vapors which are in a contiguous form may be most highly expanded; and the expansion may grow more and more if only a constant stream of water be furnished from which new vaporous particles may not only continually arise and pass into the contiguous mass, but also be in a continual current from one vapor to another, flowing from the bottom to the top, and thus affording them room and opportunity for expanding themselves still further. And if any of these particles burst by too great an expansion, the diffluent water hence arising and illapsing into the surfaces of the neighboring particles always furnishes them with fresh means for a still further expansion. 4. Particles of vapor differ from bubbles of water in this, namely, that the former contain only ether, while the latter contain both ether and air. 5. In every bubble of water is contained all that had previously existed up to this time even from the first simple, not only every genus of finites and actives, but also the elementaries, concerning which it has been treated; thus in a small bubble our world, both visible and invisible, is latent.

## Chapter XI.; Concerning the vortex surrounding the earth and the earth's progression from the sun to the circle of its orbit.

1. In the solar vortex formed by the spiral motion of the elements from the centre to the circumferences, the elementaries are not only reduced and arranged into a regular position and motion, but are perennially kept in this position and motion by the sun which is in the midst. Consequently there is in this vortex a force or effort from the centre and to the centre according as the bodies are lighter or heavier in the volume of the element. 2. The earth perpetually revolves around its axis like a large finite, and spontaneously, that is, from the effort of its individual parts constituting its central globe; and thus, immediately on its leaving the sun, the earth began to pass through days and nights. When the earth first left the sun it seems to have performed its revolutions more rapidly than afterwards at a distance from it, when a great part of it had been used up in the formation of ether, air, water, and terrestrial matter and when it was more bound and coerced by a crust consisting of various entities. 3. The earth, like a large active, has a tendency to a second motion, or to circles around the sun, by means of which it forms a surface not unlike the above mentioned actives; but still it is carried around the sun principally by the stream of the solar vortex. Consequently, from the beginning of its excursion, winters and summers, springs and autumns, in a word years, were continually passed through and completed, but much more briefly and rapidly than at the present day. 4. The earth, revolved among the elementary particles of the solar vortex according to its magnitude and the velocity of its motion, formed around itself a vortex, not otherwise than the very small magnetic corpuscle [treated of in the Second Part]; consequently in the beginning of its excursion it first described a larger but afterwards a smaller vortex. The earth, when thus lying in the centre of its vortex, is in its natural position, neither can it be transferred out of its vortex, nor move unaccompanied by the vortex. As long as the axillary motion remains so long the vortical motion of the parts also remains, always determined

and proportioned to the size and velocity of the body. 5. The vortex formed around the earth seeks an equilibrium in the solar vortex, that is, occupies the place where it can be in a state of equilibrium. Were the vortical motion greater or swifter it would seek a different locality from what it would were the motion less or slower. This, however, does not prevent the elements of the solar vortex from exercising a pressure within the minor vortex also, in proportion to their altitude and similarity in every direction. Nor does it prevent them from exercising this pressure if smaller vortices be formed within the larger; and thus from the general pressure of the solar vortex there arises a tendency (*nisus*) to the centre of the earth. 6. The greatest motion of the solar vortex is around the centre and is less and less towards the circumferences, and least or none in the ultimate circumference; and this in the plane of its zodiac. 7. The earth, which is compelled to form innumerable spiral circles in its passage around the sun, travels with a velocity gradually diminishing in proportion to its distance from the sun. Its motion also is diminished according to the circles it describes, or its annual gyrations in a simple ratio; but in relation to the diameter or right line drawn perpendicularly to the sun, in a duplicate ratio. 8. But with regard to the velocities in the solar vortex at the various distances from the centre, I say that they are in the diameter in the subduplicate ratio of the distances from the ultimate circumference, or from that circumference where all motion ceases. In like manner in the solar vortex the times are in the subduplicate ratio of the distances from the ultimate circumference to the centre. If, however, the vortex be such that the least motion is in the centre, and always greater towards the circumferences, then the velocities and times will be in the duplicate ratio of the radii from the centre. 9. If two planetary bodies are flowing in the solar vortex, each at a different distance from the centre, and each in a circle or ellipsis around the sun, I say that the squares of the periodical times of each body will be as the squares of the radii divided by the distances or complements of the radii extending to the ultimate circumference. If, however, the vortex be so formed that its least motion is in the centre, and its greatest always towards the cir-

cumferences, then the squares of the periodical times will be as the cubes of the distances from the centre. 10. Two planetary bodies flowing at unequal distances from the sun or centre differ in their velocities; and their velocities are as the rectangles of the radii and times reciprocally. If, however, the motion increases from the centre towards the circumferences, then the velocities will be in the subduplicate ratio of the radii. 11. If two planetary bodies gyrate at unequal distances from the solar centre the centripetal forces are as the distances from the ultimate circumference divided by the radii. In the vortex, however, whose motion is less at the centre and greater towards the circumferences, the centripetal forces are reciprocally as the squares of the radii.

## Chapter XII.; Concerning the paradise of the earth and the first man.

1. A crust formed itself upon the water by the dissolution of the parts in the water and the interjection of finites which emerged to the surface and formed upon the water a crust which continually increased by an addition of parts one under another. 2. The earth underwent innumerable changes before it arrived at its orbit or fixed circle, that is to say, changes as numerous as the circles it completed, or the different distances of these circles from the sun; as numerous also as were the degrees of velocity in the course of its annual and diurnal revolution; in a word, it underwent some new change every day and hour while it travelled from the sun to the circle of its orbit. The system of the earth (*mundus telluris*) must have undergone innumerable changes before it could have been fully perfected and have consisted of so many series of things simultaneously and successively arising, or before it could have been enriched with so many entities as would suffice for all its kingdoms, the mineral, vegetable, and animal; before also it could have sown (*poneret*) its seeds, afterwards unfolded and expanded them, and so delightfully and variously adorned its own surface. 3. In that state of the earth, when it revolved more rapidly about its axis and gyrated more rapidly around the sun, or when the earth measured out shorter days and years, there was a kind of

perpetual spring upon the whole earth, a condition most highly adapted for the generation as well as the procreation of things. Without this perpetual spring no seeds would have germinated (*nascerentur*), nor could vegetables and animals of every kind have been produced.

*The End.*

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## NOTE AND COMMENT.

**Change in Editorship of the New Philosophy:** In accordance with the action of the Swedenborg Scientific Association at its last annual meeting the New Philosophy passes, with this number, under new editorial guardianship, and Dr. Harvey Farrington, of Glenview, Illinois, is the editor selected. Dr. Farrington has been prominently connected with the Swedenborg Scientific Association since its inception and has been one of the most interested and active workers on its committees. These facts, together with his well-known experience in the field of medicine upon which so many of Swedenborg's early works intimately touch, give great promise for the future of the journal under his care.

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## SWEDENBORG AND THE LOCALIZATION OF BRAIN FUNCTIONS.

### The Newly Awakened Interest in Swedenborg's Scientific Works in Europe.

Under the title *Swedenborg redivivus* Dr. Max Neuburger of Vienna contributes an article to the *New Free Press,* of Vienna, in its issue of Sunday, September 20, 1903, in which he describes the zeal displayed by the recently appointed committee of distinguished scientists of the Swedish Academy of Sciences for the purpose of investigating and publishing the scientific works of Swedenborg. "What a contribution the history of scientific thinking has to expect from this bringing to light of Swedenborg's works may be judged from the list of names of those engaged: Retzius, Loven, Henschen, Arrhenius and Nathorst." The article is lengthy, occupying six entire columns of the Vienna daily, and is written in a style of much literary beauty, without sacrificing the scientific accuracy the subject demands. Only a brief extract can here be translated.

"A mighty and enflaming spirit must indeed breathe forth from those dust-covered papers which went directly from the author's desk to the shelves of the Academy's Archives, when investigators of such fame, men who have hitherto occupied themselves only with searching out

the secrets of nature, come together to devote themselves for a time to the self-sacrificing labor of text-study and criticism. There must dwell a substance in those pages far outreaching the limits of a single searcher's lifetime when the representatives of such varied fields of labor, Anatomy, Physiology, Pathology, Chemistry and Physics, Geology and Paleontology find here the object of a common enthusiastic devotion."

"These renowned names, their diversified lines of study, the unusual fact of naturalists turning themselves to the service of Clio in order that they may cleanse the monument of the "Swedish Aristotle" from the grime of contemporary abuse, must certainly strike with wonder those multitudes who on second-hand rumors have been accustomed to smile at the "arch-phantasist" and "spirit-seer," without holding it worth while to halt and give a glance into the scientific works of this extraordinary man. Those, however, who already before this imposing announcement of an authoritative body of judges have studied the revered author in a spirit equally void of enthusiasm and of prejudice and have recognized in many a line of his scientific works the anticipations of modern, even of the latest, scientific conclusions, will regard this as a tardy, but not less significant triumph of justice, that the gates of the Walhalla of the Learned at length open to the great investigator."

Dr. Neuburger proceeds here to raise the question, how could so exact a scientific mind and so devoted a student of nature lend himself to the later role of the mystical interpreter of the Bible and seer of spiritual things, and he replies: "To one who knows the scientific works of Swedenborg this chasm of separation is not so deep. For there was a common fundamental principle which bound the early scientific with the later theological writings and that was the striving after the transcendental knowledge. Swedenborg lets his whole life be told in one sentence. It was a *Search for God.*" . . . . "Pre-eminent as Swedenborg stands, whether setting forth the hypothesis of the central sun, whether deriving the process of chrystallization from the grouping of bullular atoms, whether making the nebular hypothesis the basis of a cosmology or trying to resolve chemistry into geometry and anticipating like a Leverrier of Chemistry the composite nature of water,—in reality he reaches a far greater height exceeding the loftiest expectations, when by the inductive method, from anatomic physiological facts, he arrives at the very laws of life itself and in this realm discovers many particulars by virtue of his own research in both physiology and anatomy which had escaped the learned profession."

The article closes thus: "The hasty sketch has accomplished its purpose if it has succeeded in directing into entirely new ways the interest in the 'Spirit-seer.' The joint labors of the Stockholm savants will gratify this interest in all respects. We believe that as soon as their results are known the name of Seer, now ironically given, will be first

applied to the great Swedish philosopher in its true meaning, for the great Swedenborg was indeed a Seer in all the realms of nature!"*

Besides this significant notice we have received two brochures containing extracts from the August and September numbers of "Janus" Huitieme Annee VIIIe Livr. The first being an article of Dr. Neuburger on "Swedenborg and the Doctrine of the Vita Propria" (*Swedenborg's Stellung zur Lehre von der Vita Propria*), the other entitled "What did Swedenborg teach regarding the Function of the Corpora Quadrigemina? (*Was Lehrte Swedenborg uber die Funktion der Vierhugel?*")

In the first Dr. Neuburger says: "The great physiological system set forth by Swedenborg in his two works, *Oeconomia regni animalis* (Amsterdam, 1740-'41) and *Reguum animale* (Hagae Comitum, 1744), contains such a number of successful anticipations of modern science that we do not wonder when we see how feebly his contemporaries grasped the true greatness of this Aristotle of the North. All the more strange is it however that the spirit of medical investigation elsewhere so lively in these times should have left untilled a field so rich as this in possibilities. The splendid task still awaits the competent pen that shall adequately present the anatomical physiological system of the great Seer at once in the framework of his own time and in the light of present knowledge."

The author here, in a note, calls attention to the fact that "as early as 1845 no less an authority than the world-famed anatomist Anders Retzius has recognized the merits of Swedenborg in this field of research. . . . In an address before the Swedish Academy of Sciences he said of Swedenborg's *Reguum animale:* 'One finds here ideas which belong to the most recent learning, a spiritual horizon, a logic, a comprehensive grasp which can only be likened to that of Aristotle. One may well assume that it will take more than a single decade to attain to a truly worthy estimate of this work."

Dr. Neuburger proceeds to remark in his essay: "In the same spirit I have not long ago delivered an address, which pointed out that Swedenborg discovered before Schlichting the respiratory motion of the brain and that he was the first to assign exclusively to the cortex cerebri the psychical functions and indeed located the centers of the muscular activity in the cortex. The friendly recognition accorded to this address encourages me to present to the profession the following modest

*It may be worth while to remark here that Swedenborg never himself assumed the title of "Seer" either before or after his illumination, and that while those who accept his theology and his revelations of the spiritual world will regard the seership of nature as incomplete without the informing light of the higher revelation, still for those who can only follow Swedenborg in his natural researches the title of a "Seer in all the realms of nature" is one admitting of no narrow and materialistic interpretation, according to Swedenborg's own definition of his purpose and aim.

sketch, a drop of water merely, which, with their co-operation, may develop into an ocean of Swedenborgian medical research."

The address referred to is that delivered by Dr. Neuburger before the 73d Convention of Naturalists and Physicians in Hamburg, and published in the Vienna Medical Weekly, 1901, No. 44. Its title is *Swedenborg's Relation to Brain Physiology.* It was translated into Swedish by Professor C. G. Santesson (Hygeia, 1902), and referred to in the British Medical Journal March 21, 1903. By this means the attention of the medical faculty has been widely drawn to the two works—the *Animal Kingdom* and the work on *The Brain.*

Professor Gustav Retzius wrote to Dr. Neuburger on the 9th January, 1903: "Your address has roused my wonder, especially your proof that Swedenborg had really in sight the localization" (of the psychic functions). It was on Professor Retzius's motion that the Swedish Academy of Sciences has appointed its committee to publish the unedited MSS. of Swedenborg. To this committee belong Retzius, Loven, Nathorst, Arrhenius and Henschen. Dr. Neuburger expresses his regret that on writing this Hamburg lecture he was still unaware of Dr. Tafel's translation of the work on the Brain, and also of the eloquent endorsement given this work by Professor Loven in a private lecture delivered before the Swedish Academy in 1883, wherein he calls attention to Tafel's translation and shows that Swedenborg detected the localization of intellect and motility in the cortex; that he discovered before Cotugno the existence and meaning of the liquor cerebro-spinalis and anticipated in a marvellous way the results of the researches of Key and Retzius regarding the cerebral lymph system.

The essay itself of Dr. Neuburger is full of striking instances illustrated by full quotations of Swedenborg's doctrine of the vita propria or the instinctive vital intelligence, choice and activity shown in the minutest organs of the body, and we hope to see it translated in full for our pages. He concludes:

"I have purposely allowed Swedenborg to speak for himself so that the reader may be left to an unbiased judgment. That I should have paid little attention to reminiscences of the past and comparisons with contemporaries and found far richer material in the resemblances to the latest physiological views is only another strong evidence showing how little the great Swedish thinker has become antiquated. At his lamp well might the science of today light her torches! What he with Seneca awaited: "Venient, qui sine offensa sine gratia judicent" may yet at last come true. The time is come to fulfill the requirement of justice."

### The Function of the Corpora Quadrigemina.

In the second of the above mentioned brochures from the monthly periodical "Janus" Dr. Neuburger treats of Swedenborg's teaching regarding the Functions of the Corpora Quadrigemina (die Funktion der Vierhugel). He begins:

"To waste words with the Medical Faculty about Swedenborg's physiological achievements I regard as unnecessary, since the Stockholm Academy of Sciences is about to publish the manuscript remains of the Swedish Aristotle."

"In this treasure, among others, there is a special treatise on the Brain already made accessible through the valuable labors of Dr. R. L. Tafel, but hitherto unutilized by the medical historians. To invite to a study of this monumental work and to show how Swedenborg, in spite of the poor facilities of his time, outstrode with giant steps his own century in this difficult field, I will cite a passage from his treatise which will throw convincing light on the force of his achievement." After referring to Swedenborg's discoveries of the central canal of the spinal cord, the psychical functions of the cortex of the brain, his surprising conclusions as to the localization of motility in distinct parts of the cortex, and his view of the purpose of the liquor cerebrospinalis, the article proceeds:

"In the same anatomical method he sought also to explain the function of the Corpora Quadrigemina (Vierhugel) in relation to the neighboring region of the Sylvian duct. The result must astonish equally the historians and the neurologists, the former in view of the errors of the old authorities, the latter in view of the latest data of our present knowledge. It means that the *Vierhugel, and the gray matter of the duct of Sylvius, control the movings of the eyes* (especially their co-ordination) *and the accommodation of the iris.* . . . Modern science has not only established the fact of the ocular-motor lying beneath the Sylvian duct, but it is known by clinic observation that diseases of the Vierhugel are accompanied with the weakening of the nuclean eye-muscles and sometimes also with a disturbance of the pupil's reaction and accommodation. . . . Swedenborg wrote his work on the brain in two efforts, the first in the years 1735-1738, the other in 1741-1744. If one will compare the cited passages with corresponding productions of his contemporaries the true conclusion declares itself."

The medical profession of America, as well as that of Europe, may feel itself greatly indebted to Dr. Neuburger for his bringing to light these treasures of practical anatomical and physiological knowledge from a source they have so long and so unworthily treated with neglect.

Frank Sewall.

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**Swedenborg and Solar Energy:** In an essay on the *Source and Maintenance of Solar Energy,* by J. Morrison, M. A., M. D., Ph. D., reprinted from *Popular Astronomy,* October, 1902, the author speaks of the theory now known as the "Nebular Hypothesis of Laplace" as being "first suggested by Sir William Herschell from a careful study of the nebulae, and subsequently and independently by three of the most profound and learned philosophers that ever lived, viz.: Swedenborg, Kant and Laplace." This statement contains two errors. Swedenborg's theory was not subsequent to Herschell's, as the latter astronomer was born in 1738, and Swedenborg's *Principia* containing his entire cosmogomy was published in 1734. Instead of the nebular hypothesis being "first suggested" by Herschell, the Russian astronomer Nyren has pointed out that that distinction clearly belongs to Swedenborg. See *Vierteljahrschrift der Astron. Gesellsch.* Leipzig, 1879, p. 81.

Kant, Buffon and Laplace to whom the nebular hypothesis is generally accredited all wrote subsequently to Swedenborg and had access to his writings—Laplace informs us himself that his first ideas on the subject of the nebular cosmogony were gotten from Buffon, and the very copy of the works of Swedenborg owned by Buffon and bearing his signature may be seen at the Swedenborg book rooms at 3 W. Twenty-ninth St., New York.

FRANK SEWALL.

# INDEX

TO

# The New Philosophy.

VOLUMES I—VI.

## INTRODUCTORY NOTE.

This index is arranged alphabetically by authors and titles of papers. Thus under the name of an author may be found a complete list of all his papers published in the first six volumes of the New Philosophy. In case the title of an article is known, but not the name of the author, it may readily be found by looking in the proper alphabetical division.

The Roman figures refer to the volumes and the Arabic to the pages.

E. F. S.

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### KEY TO INITIALS AND SIGNS.

| | |
|---|---|
| A. H. S. | Alfred H. Stroh. |
| C. H. A. | Carl Hj. Asplundh. |
| C. R. M. | Prof. C. Riborg Mann. |
| C. E. D. | Prof. C. E. Dœring, A. M. |
| C. T. H. | C. Th. Odhner. |
| E. S. P. | Prof. E. S. Price, A. M. |
| F. S. | Rev. Frank Sewall, M. A., D. D. |
| H. F. | Harvey Farrington, M. D. |
| J. R. S. | John R. Swanton, Ph. D. |
| J. W. | Rev. John Whitehead. |
| L. B. | Miss Lillian Beekman. |
| L. F. H. | Rev. Lewis F. Hite. |
| L. P. M. | Rev. Lewis P. Mercer. |
| N. C. | Note and Comment. |
| Q. | Quoted. |
| R. W. B. | Rev. R. W. Brown. |
| Sw. | Emanuel Swedenborg. |
| S. S. A. | Swedenborg Scientific Association. |
| W. F. P. | Rev. W. F. Pendleton. |

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